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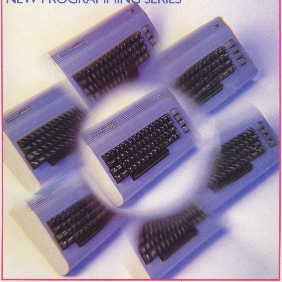

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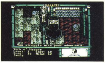

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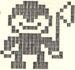
GAMES AND UTILITIES



VOLUME 4
NUMBER 3

ARGUS
PRESS
GROUP

Watch out for our Hardware Buyer's Guide - on sale November 20th.

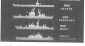
DATA STATEMENTS

Combat Simulation

Argus Press Software have got themselves in dangerous waters with their submarine simulation, *The Hunt for Red October*. The storyline has been taken from Tom Claray's best selling novel and you play the part of a defector in command of a submarine that is being hunted by the entire Russian Navy. Your aim is to make a rendezvous with the American Navy – but the Russians have other plans for you. The gameplay is detailed and challenging, providing plenty of scope for strategy and simulation fans.

The Hunt for Red October will be available soon on the Commodore 64. (Price to be announced.)

Put tactical warfare in a new dimension with Rainbird's re-released *Tracker*. The battle is fought around a military training simulator known as the Centrepoint on the planet Ergon. The planet's attendant Cycloid robots now control the complex and it's all down to you to destroy the Centrepoint computer.



You'll need your wits about you to fight the frenetic battle which combines fast strategic manoeuvring with high speed solid graphic 3-D battle sequences. It's all down to you to wipe out the destructive hordes of renegade Cycloids with simultaneous control of up to eight shimmer craft.

The Hunt for Red October

Tracker is available on the Commodore 64, priced at £14.95 (Ca) and £17.95 (Dsk).

Touchline:

Argus Press Software: *Victory House, Leicester Place, London WC2H 7NB.* ***Tel:*** *01-439 0666.*

Rainbird Software: *Wellington House, Upper Martins Lane, London WC2H 9DL.* ***Tel:*** *01-240 8838.*

Win a Weekend Break

Softsel, the distributors of microcomputer hardware and software products have organised a promotion which offers Softsel dealers who buy ten or more Migent products a chance to enter a draw for a free weekend for two in the UK.

Peter Scatchard, Marketing Manager for Softsel comments: 'Softsel will be offering a free unit for every ten Migent products purchased, in addition to the free draw for a weekend break.'

Migent now produce a graphics package in the form of Page Ability, which is aimed at the desktop publishing market and priced at £199. The Page Ability is fully integrated with the rest of Migent's range which consists of Ability (£99), Ability Plus (£199) and the Account-Ability – the complete small business and personal accountant (£99).

Touchlines:

Softsel: *Softsel House, Syon Gate Way, Great West Road, Brentford, Middlesex TW8 9DD.* ***Tel:*** *01-568 8866.*

Bizzy-Body

Bizznet is the new service, available on Prestel which is aimed at the small businessman and includes everything from on-line tax and legal advice to information on pension schemes, money and stocks and shares. Users can send experts questions electronically and then read the replies on their terminal at home or in the office. An on-line accountancy service, run by M.A.S. is also on offer. Other features of Bizznet include insurance, investments, DHSS, running a small business, start-up schemes and property.

Micronet's Commercial Director Simon D'Arcy commented, "Bizznet is aimed at those people who already have a PC, but are looking to get more value out of it. It brings the advantages of instant information and interaction to the businessman."

Touchline:

Micronet: *Durrant House, 8 Herbal Hill, London EC1R 5EJ.* ***Tel:*** *01-278 3143.*

The Choice is Yours

Let's hope Mary Whitehouse doesn't read the computer press, as I'm sure this recent release from Virgin would cause her to throw up her arms in disgust! *How to be a Complete Bastard* is exactly that – based on Adrian Edmondson's book, the game allows you to go to a party, and basically cause havoc.

You go by the name of Ade and aim of the game is to score as many bastard points as possible and light up every letter in the phrase 'complete bastard' by particularly deviant behaviour. The game features 'bastavision' which allows you to see what's going on in all corners of the house, so as not to lose a chance of being horrible slip away.

If this sort of game turns you on, it's available on the Commodore 64/128, priced at £9.95 (Ca).

Touchline:

Virgin: *2-4 Vernon Yard, Portobello Road, London W11 2DX.* ***Tel:*** *01-727 8070.*

On the Hardware Front

The Competition Pro Extra is a new joystick now available from Dynamics Marketing Ltd. The joystick, priced at £16.95, features an auto-fire option with slow motion movement for better control in sticky situations.

Dynamics' Kevin Parsons, General Manager comments, 'We know that the new Pro Extra with rapid-fire will fill a need in the market but the Competition Pro 500 joystick continues to be our main product bought by discerning users throughout the world.'

In a bid to make the computerised office a safer place, Accodata are launching a new range of computer equipment and accessories. The products include the PCMate priced at £119, which comprises a range of personal computer and printer furniture; Keyboard Slideaway priced at £39, which enables the PC keyboard to slide under the monitor when not in use, which saves deskspace and protects the keyboard from dust and spills; the Printer Muffler which is a range of acoustic hoods for 80 and 132 column printers, which can reduce noise by up to 80% (£69 - 80 printer, £75 - 132 column printer). Also Diskette Fire Safe, priced at £525, which has a capacity of 105 $5\frac{1}{4}$" or $3\frac{1}{2}$ disks and Data Cartridge Boxes, priced at £17.50 and £19.50, which have been designed for convenient filing and retrieval of up to ten standard or mini data cartridges.

Touchlines:
Dynamics Marketing Ltd: *Coin House, New Coin Street, Royton, Oldham OL2 6JZ.* ***Tel:*** *061-626 7222.*
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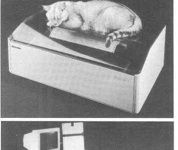
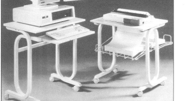




Arcade Action

Can you free your father from the urban jail in Mean City? This is the question that a new release from Quicksilva asks in *Mean City*. You play the part of Sante, son of mutant rebel leader Hante, and it is your task to free your father from the jail in the city of Concurb 2 G-Gow. It is also a battle against your cousin – Calte – who eventually wants to lead Concurb, and the only way he can do this is by getting to your father before you and killing him. To free your father you must collect four parts of the key, and all the time you have to be on the look out for your opposers who appear in the form of city citizens, police, enforcer druids and the anti-mutant league!

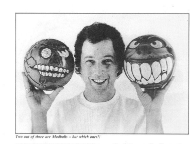
Available on the Commodore 64, priced at £9.95 (Ca) and £14.95 (Disk).

In *Terramex*, a further Quicksilva release, you have to hunt for the famous brainy professor – Dr Eyestrain. An asteroid is about to collide with Earth and the only person that can help is yes – you've guessed it – Professor Eyestrain! But first, you've got to find him. Packed with humour and action it's up to you to find the Prof, persuade him to help and then collect the equipment he needs to put his defence plan into operation.

Terramex is available on the Commodore 64/128, (Price to be announced.)

Intrigue by Mirrorsoft enables you to become a master investigator by solving the case of a missing person. It is very important that you find this missing person as it happens to be your brother – Joe. You find out that Joe, a

DATA STATEMENTS



Two out of three are Madballs – but which ones?!

private investigator, has been working on a case that involves a dangerous virus that may be released into the air of our nation's capital. It's all down to you to deactivate the device that will unleash the crippling virus, and name the villain behind the crime. Successful hunting!

Intrigue is available on the Commodore 64. (Price to be announced.)

Soon to be released from Ocean is *Madballs*, featuring those weird and wacky toy characters. This action packed game features Dust Brain (a dried-up mummy head which is not too tightly wrapped) who is a member of the notorious Madballs political party who are the current rulers of the planet Orb. However, Dust Brain is convinced that his politics are right and sets out on a bureaucrat-bashing exercise to eliminate the oppositions. You play the role of Dust Brain and it's your aim to convince the rest of the Madballs to favour your policies.

Available on the Commodore 64, priced at £8.95.

Fun and games are in store with *Jinxter* soon to be available from Rainbird. The game is set in the land of Aquitania – a land which has been protected by a magical charm bracelet – but is now under the control of the Green Witches. It's up to you to find and link together the seven charms of the bracelet, and only then will harmony be restored to Aquitania. To keep up with the Rainbird tradition, the game is packed full of puzzles, graphics and extensive descriptions.

Available on the Commodore 64/128, priced at £19.99 (Disk).

CRL's recent release, *I Alien – Hunted by Man* puts you in immediate danger of becoming a guinea pig for new laboratory specimens to cultivate a new food source. This is due to a nuclear war wiping out Earth's entire animal population and planets are now being combed and so their experiments can begin.

Your only means of escape is your pod, which will take you to another planet for help. But of course there are many obstacles en route to your pod, which include droids, ice dragons and mutants.

Available on the Commodore 64, priced at £9.95 (Ca) and £14.95 (Disk).

Ninja Hamster is now available on the Commodore and promises not to be your run-of-the-mill karate game. On return from foreign conquests, *Ninja Hamster* returns home to find his village in the evil grip of his arch enemies Sinster Rat and The Lizard of Death. *Ninja Hamster* launches his quest to rid his village of evil in a frenzy of flying fists, gnashing teeth and kicking feet.

Available on the Commodore 64, priced at £9.95 (Ca) and £14.95 (Disk).

Now available on the Commodore is the popular coin-up arcade game, *Super Sprint*. Available from Electric Dreams, the game offers intense head-to-head racing action from a bird's eye view point. Lots of fun to be had with eight different tracks to negotiate, which includes jump ramps, opening and closing gates, hidden short cuts and under passes and banked corners.

Super Sprint is available on the Commodore 64/128, priced at £9.99 (Ca) and £14.99 (Disk).

Bangkok Knights from System 3 brings all the thrills and spills of Thailand's martial art. Using Muay Thai (Thai boxing) you must fight your way from the cliff ledge above your village, through the jungle and onto the streets of Bangkok. Only when you have got this far, and beaten street opponents can you enter the Lumpini stadium where you will encounter the greatest exponents of the sport – the Bangkok Knights.

Available on the Commodore 64/128, priced at £9.99 (Ca) and £14.99 (Disk).

Touchlines

Quicksilva/Argus Press Software: *Victory House, Leicester Place WC2H 7NB.* ***Tel:*** *01-439 0666.*

Mirrorsoft: *Athene House, 66-73 Shoe Lane, London EC4P 4AB.* ***Tel:*** *01-377 4645.*

Ocean Software Ltd: *6 Central Street, Manchester M2 5NS.* ***Tel:*** *061-832 6633.*

Rainbird: *First Floor, 74 New Oxford Street, London WC1A 1PS.* ***Tel:*** *01-240 8838.*

CRL: *CRL House, 9 Kings Yard, Carpenter's Road, London E15 2HD.* ***Tel:*** *01-533 2918.*

Electric Dreams/Activision: *Activision House, 23 Pond Street, Hampstead, London NW3 2PN.* ***Tel:*** *01-431 1101.*

System 3 Software/Activision: *23 Pond Street, Hampstead, London NW3 2PN.* ***Tel:*** *01-431 1101.*

A Matter of Scruples

Based on the popular (or not so popular) board game, Leisure Genius (Virgin) are due to release the computer version. In addition to 230 questions of moral dilemmas, the computer edition has an exciting array of computer people with simulated intelligence to play with you (that's if you can't round up the real thing). There are 64 computer personalities which are pre-decided and human players must select their looks from a gallery of faces, and then adjust their personalities by means of character attributes.

Available on the Commodore 64/128, priced at £12.95 (Ca) £14.95 (Disk).

Touchline:

Virgin: *2-4 Vernon Yard, Portobello Road, London W11 2DX.* ***Tel:*** *01-727 8070.*

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These ram packs, when combined with the EXPERT make the ideal software developers tool; further developments on this theme will be announced soon.

With these ram packs, TRILOGIC have given programmers an exciting opportunity to develop commercial software which is presently limited by the internal memory size & slow CMB disk drives.

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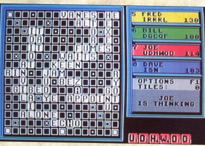

SCRABBLE

Word game fans everywhere will be sitting up and taking notice of this latest release from Leisure Genius, as it provides the only thing missing in the normal game of Scrabble – opponents. As a small quiz for word fans, which of the following two letter words would be allowed — ai, da, jo, st and yu?

Although other humans can play, the effect isn't particularly stunning as you are forever having to send people out of the room so that they can't see your titles. You can play against up to three opponents and choose from up to eight skill levels for each. Levels one to four are relatively easy. An extra section of obscure words is accessed for the higher levels.

The computer boasts a vocabulary of some twenty thousand words. This means that there are going to be quite a few occasions when you play a word that it doesn't recognise. It will then challenge you and ask whether that word was correct or not. This is fair enough, but I suppose that if you are the sort of person who plays 'XZQJ' on a triple word score, you are not going to remove it when challenged.

Another feature is that you can now play against the clock. A time limit per move of anything between ten seconds and ten minutes can be set.

The board is a fairly uninspiring display but, as they say, the game's the thing and I was very pleasantly surprised at the quality of the game it gave me. It has a tendency to close the board down where-ever possible so you will have to do your homework and bone up on all those little two letter words.

In answer to the quiz above, they are all OK meaning a three toed sloth, a Burmese knife, a beloved one, hush and precious jade respectively. Be warned, the computer knows at least four of the five.

Touchline:

Title: *Computer Scrabble Deluxe.* ***Supplier:*** *Leisure Genius/Virgin Games, 2-4 Vernon Tard, Portobello Road, London W11 2DX.* ***Tel:*** *01-727 8070.* ***Machine:*** *C64.* ***Price:*** *£12.95 (Ca) £15.95 (Disk).*
Originality: *7/10.* ***Graphics:*** *5/10.* ***Playability:*** *9/10.* ***Value:*** *8/10.*

G.R.H.

Cardboard 5

Five cartridges into one slot will go with this useful C64/C128 add-on.

By Stuart Cooke

If, like myself, you have a number of cartridges that you use often, it can be a real pain repeatedly turning off your C64, pulling out the cartridge, putting the new one in, loading the software that you were looking at and then starting all over again. Well the Cardboard 5, available from Precision Software will change all of that.

Essentially the Cardboard 5 is a cartridge expansion board. It comes complete with five replicas of the normal Commodore cartridge port on it. A series of switches allow you to have a cartridge in each of these slots. Altering the switches and pressing the reset button, provided on the Cardboard 5, allows you to change the cartridge in use, without resorting to powering down your computer.

Blackpool Illuminations

Beside each of the cartridge slots there is a series of LED's. These small lights allow you to monitor the behaviour of the following lines:

Power indication for each cartridge
Cartridge Request Enable
XROM request for each cartridge
GAME ROM request for each cartridge.

With five cartridges installed the board starts to take on the appearance of the proverbial Christmas tree.

Knowledge of what each light refers to is required as it is important to know at a glance which cartridges are powered up and selected for use. A knowledge of what the lights mean is also useful when setting up for operation.

Switching them in

The various switches that are on the board allow you to set up each of the expansion slots to operate in different ways. Careful monitoring of the LEDs, already mentioned, together with careful experimentation with the switches should give you the correct positions for the switches for certain cartridges.

The reason for the various switching options is due to the increasingly complex way in which manufacturers are designing their cartridges.

Sorting out what switch combination to use with each cartridge should cause no problems, as long as you follow the instructions given in the extremely clear manual, even though this doesn't claim to give all of the answers.

Neat tricks

Not only does the Cardboard 5 give you the ability to change the cartridge selected for operation with ease, it also gives a couple of extra features.

Firstly, so long as the power switch for a specific cartridge is off, you can unplug cartridges from the expansion board, or even plug new ones in. This feature is extremely handy if you have more than five cartridges that you use.

Secondly, if you have two cartridges that don't use the same area of memory you can have them both enabled at the same time.

Let's say that you had a wordprocessor on cartridge and a fast load cartridge. Wouldn't it be great if you could use them both at the same time? So long as the cartridges don't use the same areas of memory then with Cardboard 5 you will be able to use both together giving you not only an instant wordprocessor but also fast disk access.

I must admit that I didn't manage to try the above claim out, since all of my cartridges are utilities and use similar areas in the C64s memory.

Construction

I feel that the construction of the Cardboard 5 could have been a little better. The underside of the board is simply covered with expanded polystyrene; this becomes the base that the Cardboard 5 sits on. The top of the case is fairly rugged plastic. Why couldn't the whole board have been covered with the plastic case? It would have made the whole product a lot more sturdy.

Using the expansion card provided no problems at all. I eventually got the card to work with all my cartridges, after messing around with various switches. The Expansion card is presently sitting at the back of my 64 with my most regularly used cartridges plugged in, ready for use at any time.

If like me, you use a number of cartridges on a regular basis then the Cardboard 5 is just what you've been waiting for.

Touchline:
Name: *Cardboard 5.* ***Supplier:*** *Precision Software, 6 Park Terrace, Worcester Park, Surrey KT4 7JZ.* ***Tel:*** *01-330 7166.* ***Price:*** *£30.39 (ex. VAT).*

Using the Z80 Microprocessor on the C128

Did you realise that you could use the Z80 microprocessor without running CP/M?

By Leigh Brown

As everyone that has a C128 knowns, it has a Z80 used for CP/M- However, not everyone knowns that you don't have to be running CP/M to use it. To facilitate the Z80, you clear bit zero of location D505 by:

```
POKE 54533, 176
```

However, this will reset the machine as the Z80 will execute an RST 08, which is the reset outline. As the next instruction is at FFEE all we need to do is replace the RST 08 with a jump to our Z80 program. First, the Z80 program.

```
21 40 21 LD HL,2140          ;start address of block
11 00 20 LD DE,2000          ;destination address
01 00 1E LD BC,1E00          number of byte to copy
ED BO       LDIR             ;copy block
C3 EO FF JP FFEE             ;return to FFEE
```

As the monitor only assembles 8502, enter:

```
>1400 21 40 21 11 00 20 01 00
>1408 1E ED BO C3 EO FF
```

Now, redirect the Z80 code at FFEE:

```
>FFEE C3 00 14
```

Finally, enter the 8502 loader:

```
A 1300 SEI
A 1301 LDA # 3E
A 1303 STA FFOO
A 1306 LDA # BO
A 1308 SRA D505
A 130B NOP
A 130C CLI
A 130D RTS
```

To call the Z80 routine, call the routine at 1300 hex.

Finally, here is a demonstration:

```
10 GRAPHIC 1,1
20 CIRCLE 1,159,99,99
30 BANK 15
40 SYS 4864
50 END
```

Just replace my routine with yours and if you want to move the start address of your Z80 code, change the jump at FFEE. Also, the Z80 BIOS ROM is located from 0 to FFF so do not use this area for programmes or data. And remember that to access the I/O area you must use the IN and OUT commands. Who knows? There may eventually be a Z80 assembler for the C128.

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Mastertronic

The latest catalogue from Mastertronic contains nearly 100 C64 games – look ahead at the new Autumn releases from the cut-price kings.

By Tony Hetherington

In just over three years Mastertronic has grown from the first budget software house to become a major publisher with eight software labels, including the relaunched Melbourne House, a range of music cassettes and videos, Arcadia coin-op machines(based on two megabyte Amigas) and the marketing rights to the Sega Master System.

From Strength to Strength

The original Mastertronic range (£1.99) now boasts over 50 games that include the top selling Formula One Simulator, which is an adventure based on Monty Python's Holy Grail, the Gauntlet Clone Storm, BMX Racers and Trials, Speed King (the motor bike game that gave the full priced Super Cycle a race for your money), the return of Tasket's Super Pipeline II (in which you and your plumbers mate must battle against lobsters and Venusian Pipe spiders to fix a leaky pipe) and countless arcade and platform games including Pod, Video Meanies and Molecule Man.

It's a Mad, Mad World

Two years ago, Mastertronic launched its MAD. (Mastertronic Added Dimension) range of games that cost slightly more (but still only £2.99) and contained games such as Spellbound and Mastertronic that still rival their full priced counterparts.

Spellbound added "Windimation" to the adventure world as its animated hero (Magic Knight) wanders through the rooms of the mythical castle of Karn in an attempt to save Gimbel the Wizard. Whenever an adventure action such as pick up, drop, read or give is required, they are selected from window menus.

Spellbound also has six incredibly unhelpful characters including Thor, who needs a hammer, Samson who is strong but what use is Florin the dwarf, Orik the Cleric, Lady Rosmar or the wailing Bansee?

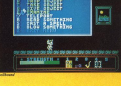
To succeed in your quest to save yourself, Gimbel and the others, you will have to keep these characters alive and get them to help solve a series of devious problems such as how do you get across a dark room full of explosive gas. Clue – using the candle has disasterous results!

If you've solved that then why not try to survive an exploration in dungeon of Master of Magic. A split screen display is your guide in this joystick-controlled role-playing game, as you attempt to escape the deadly grip of Thelric's spell.

By selecting commands you can walk, run and flee through the caverns of this dungeon and do battle with skeletons, orcs, giant bats and vampires that are displayed in lurid detail at the bottom of the screen. Defeat them and you could find magic armour, weapons, magic scrolls and rings that may help you to survive to fight another day.

Attack of the Mutant Camels is my favourite Jeff Minter game and has returned as part of the MAD range. Now for only £2.99 you can climb into your fighter and blast away at the laser bolt spitting, 90 foot high, genetically engineered killer camels. Manic arcade action with Minter at his best.

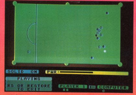
On Cue, Angle Ball and Motos form a trio of new games in this exceptional range. On Cue combines two excellent versions of Snooker and Pool on one tape and allows you to



Spellbound

set the power and direction of your shot, as well as the amount of spin on the cue ball for those key position shots that will beat your human or computer opponents.

Angle Ball takes pool into a dimension as you must battle against your opponent and the unusual angles found on a six-sided table!

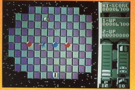


Angle Ball

Motos is a simple-to-learn, but impossible-to-master coin-op conversion of a Namco arcade machine. In this incredibly addictive game you must defend a space grid from the invasion of the space bees. These invaders must be thwarted by shoving them off into oblivion and clearing the grid to progress to the next one where you will meet more stuborn bees that will require bonus power parts to shift them. A simple but incredibly addictive game.

Ricochet is Mastertronics £1.99 label that brings back full-priced games at a budget price. The original line up of Eddie Kidd's Jump Challenge and Brian Jack's Superstar Challenge is now joined by the frantic but fun shoot'em up Crazy Comets and soon by the Ultimate arcade adventures Blackwyche, Dragonskulle and Outlaws.

Americana which was formerly US Golds budget label is now with Mastertronic and features a line-up of full-priced American software brought back for only £2.99!



Motos

Soon you'll be able to storm the beaches in the multi-stage arcade game Beach Head and in its screaming sequel Beach Head II, fly daring bombing missions in Dambusters, fight them in the ring in Fight Nights and beat them up as Bruce Lee or a Kung Fu Master.

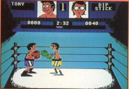
Each of these games has already featured at the top of the charts so represents amazing value at their new budget price.

Melbourne House, one of the oldest software houses was bought by Mastertronic and poses a new challenge. If Mastertronic already produce some budget games that are as good as full-priced games, then its own full priced games must be even better.

The first batch of releases include two conversions of Mastertronics own Arcadia coin-op games Road Wars and Rockford, and the amazing world of Metropolis.

Roadwars is a high-speed duel between two Battlespheres (you and your human or computer opponent to clear the road that circles the Moon of Armageddon of obstacles that range from simple barriers and spikes to powerful spaceships and creatures.

In Rockford you're on your own in a fight against time to either collect the Pharoahs gold coins in the Caverns of Craymar of the Emeralds of Erasmus hidden in the sunlit seas of Tiresuis or even the Apples of Eternal Youth from the Kitchens of Kyssandra. However, these treasures aren't gained easily as you'll have to run the gauntlet of falling rocks, battling bats, maddening monkeys and even poisonous pizzas.



Fight Nights

Soon you'll be able to enter the world of Metropolis. You came looking for a stolen tape, instead you found the once sprawling city, now empty apart from a few droids. Your job is to find out where all the people went.

Amiga owners will find cheap and cheerful games for their machine ranging from the action of Ninja Mission, Chopper X and Space Ranger to the magical world of Feud, the excitement of Vide Casino and the mind boggling hexagonal action of the six sided Pub Pool table. (All for £9.99 each.)

There's more to come not only from the labels mentioned above but also from the Bulldog (£1.99) range, Entertainment USA and now from Rack-It which is a joint deal between Mastertronic and Hewson!

Finally, the Sega Master System is a dedicated games console (that costs £99.99) and plugs into your TV and allows you to play coin-op conversions such as Quartet, Out Run, Enduro Racer and Space Harrier that are supplied on cartridges with as much as two megabytes of memory! YC

Touchline:

Mastertronic: *8-10 Paul Street, London EC2A 4JH.* ***Tel:*** *01-377 6880.*

May I Interrupt?

Interrupts are simple to create and effective in use, once you learn the secrets.

By Eric Doyle

All organisations have teams of workers behind the scenes who keep the environment clean and uncluttered. These nocturnal operations often go unnoticed and their value is frequently underestimated but without this army of night staff the wheels of industry would grind to a halt impeded by a pile of litter and dust.

Inside your Commodore there is a comparable team consisting of routines which prevent the computer from grinding to a halt.

A computer is not a very sociable creature. Left to its own devices it is quite happy to refresh the power-up screen and busy itself with the fairly demanding job of *being* a Commodore. Unfortunately, just 'being' is not enough; a machine has to work for a living otherwise it is not a machine but an artwork or curio. To work effectively a computer must communicate with the outside world: there has to be a dialogue between man and machine.

The Secret of Communication

The only way to interact with a computer is through the use of joysticks, lightpens, graph pads or a similar peripheral device. The main method of communication is the keyboard. While I'm typing away on this wordprocessor I expect to see my perfect prose exactly reproduced on the monitor screen. The fact that the Commodore is performing technical miracles at the rate of several hundred per second does not matter, but to program the next game or utility I need to fully understand what is going on behind the screens.

Like humans at work, the computer has two basic tasks. One is to outwardly perform the job the boss wants done and the other is to stay alive while doing it. As we work so we breathe, hear, feel and see. Our hearts beat, our digestive systems churn and our glands secrete. We can control some of these functions, but often they run without us fully appreciating their presence or function.

In computer terms this self-maintenance is serviced by the *Interrupt system*; a series of routines which operate so fast that they are undetectable and yet they are run sixty times every second!

Non-mask or Ask?

There are two kinds of interrupt: the non-maskable type (NMI) and the far more important interrupt request (IRQ). The NMI is of little interest other than to note that it can be caused by a peripheral device demanding attention or by the RESTORE key. In other words an NMI occurs when something shouts, 'Oi!'. An IRQ occurs every sixtieth of a second and is equivalent to the computer saying to all its peripheral devices, 'OK, be quick, what do you want? I've a million other things to do, you know.'

To the computer anything other than its own 'brain' is a peripheral; the video chip, disk drives, printers, cassette recorders and, most important of all, the keyboard. It is because of the frequency to the IRQ that response to a keypress is so swift as to appear instantaneous.

Although the central processing unit (CPU) has a lot to do during an interrupt, there is still plenty of time left for other things. If we can latch our own routines onto the interrupt chain we could effectively run two programs at once.

With great forethought, the Commodore computer architects have created an interrupt servicing routine which calls upon a vector stored in RAM to see where the main interrupt routines are stored. If this vector is found we can point it to our own routines which will then be executed as though it was part of the normal IRQ.

According to the C64 memory map these locations are the two bytes starting at location 788 ($0314).

Examining Listing one. This is a standard model for replacing the old vectors with new ones. The old vectors point towards the ROM interrupt routine at $EA31 which basically scans the keyboard. The vectors must be forced to point to $C040 which is the location of the additional routine which exits by calling the old vectors (JMP $EA31).

Caught Us Interrupting

The only real problem with changing vectors is that an interrupt may occur between changing location 788 and changing 789. If this did happen the interrupt would be thrown towards location $EA40 and a system crash would occur. This has been avoided by using the SEI instruction and the following commands which prevent interrupts occurring until the CLI command is reached.

This is all there is, just put your routines at $C040 and you need never use any other routine to set up your interrupt.

You'll notice that the routine also changes the NMI vector at $0318. This is just to demonstrate that NMI may be used for special RESTORE key functions. The simple routine at $C060 merely clears the screen, disabling the RUN/STOP-RESTORE break. You did remember to save your program before running it didn't you?

While the interrupt is running you might like to type NEW and enter and run the Basic listing. You've just turned your computer into a three-ring circle. This may seem pretty clever at the moment, but in future months I'll start going into multiple interrupts, split screens, smooth scrolling and many of the other tricks of the professional programmers' trade.

```
 10 0000                   ;LISTING 1
 20 0000                   ;SET UP FOR INTERRUPT
 30 C000                   .ORG    $C000
 40 C000 78                SEI
 50 C001                   ;DISABLE IRQ
 60 C001 8D0DDC            STA $DC0D
 70 C004 8D0DDD            STA $DD0D
 80 C007                   ;ENABLE IRQ
 90 C007 AD0DDC            LDA $DC0D
100 C00A AD0DDD            LDA $DD0D
110 C00D                   ;CHANGE $0314 VECTOR TO MAIN ROUTINE AT $C040
120 C00D A940              LDA #$40
130 C00F 8D1403            STA $0314
140 C012 A9C0              LDA #$C0
150 C014 8D1503            STA $0315
160 C017                   ;CHANGE $0318 VECTOR TO ROUTINE AT $C060
170 C017 8D1903            STA $0319
180 C01A A960              LDA #$60
190 C01C 8D1803            STA $0318
200 C01F                   ;ENABLE IRQ
210 C01F A901              LDA #$01
220 C021 8D1AD0            STA $D01A
230 C024                   ;RETURN TO BASIC
240 C024 58                CLI
250 C025 60                RTS
```

```
 10 0000                   ;LISTING 2
 20 0000                   ;INTERRUPT ROUTINE
 30 C040                   .ORG    $C040
 40 C040 A900              LDA #$00
 50 C042 8D0004            STA $0400
 60 C045                   ;INCREASE LDA VALUE IN 30
 70 C045 EE41C0            INC $C041
 80 C048                   ;INCREASE STA SCREEN LOCATION BY TWO BYTES
 90 C048 EE43C0            INC $C043
100 C04B EE43C0            INC $C043
110 C04E                   ;RE-ENABLE VIC IRQ
120 C04E A901              LDA #$01
130 C050 8D19D0            STA $D019
140 C053                   ;TEST FOR KEY PRESS
150 C053 4C31EA            JMP $EA31
```

```
 10 0000              ;LISTING 3
 20 0000              ;RESTORE KEY ROUTINE
 30 C060              .ORG    $C060
 40 C060 48           PHA
 50 C061 8A           TXA
 60 C062 48           PHA
 70 C063 98           TYA
 80 C064 48           PHA
 90 C065 A993         LDA #$93
100 C067 20D2FF       JSR $FFD2
110 C06A 68           PLA
120 C06B A8           TAY
130 C06C 68           PLA
140 C06D AA           TAX
150 C06E 68           PLA
160 C06F 40           RTI
```

```
5 SYS12*4096
10 A=(A+1)AND 15
20 POKE53280,A
30 B=(B+.1)
40 IF B>15 THEN B=0
50 POKE53281,B AND 15
55 IF B<>0THEN100
60 FORB=0TO255:POKE53270,B:NEXT
70 B=0:POKE53270,200
100 GOTO10
```

```
0 REM SET INTERRUPT
1 DATA 120,169,31,141,13,220,141
,13,221,173,13,220,173,13,221,16
9,64
2 DATA 141,20,3,169,192,141,21,3
,141,25,3,169,96,141,24,3,169,1,
141
3 DATA 26,208,88,96,500
4 REM INTERRUPT
5 DATA 169,0,141,0,4,238,65,192,
238,67,192,238,67,192,169,1,141,
25
6 DATA 208,76,49,234,500
8 REM RESTORE ROUTINE
9 DATA 72,138,72,152,72,169,147,
32,210,255,104,168,104,170,104,6
4,500
10 A=12*4096:GOSUB200
20 A=12*4096+64:GOSUB200
30 A=12*4096+96:GOSUB200
40 END
200 READB:IFB<>500THEN POKEA,B:A
=A+1:GOTO200
210 RETURN
```

Adventure Kit III

Continuing our adventure writing series, this month we look at various objects.

By Allen Webb

All adventures rely on objects, and this month I will look at the various uses they can be put to. They can be things you either pick up or use or they can be people or animals. All objects have basic features and exist at a fixed place, have a fixed size and generally have a fixed mass. These facts need to be stored in some way and manipulated. Lets have a look at one way of saving information and providing a set of routines to use it.

The code occupies $C000-$C2D0 and the area $8000 to $87FF allocated to object data. Each object has a record entry rather like conventional databases. Each record holds the following information:
1 byte specifying the object's location.
1 byte signifying whether the object is worn.
1 byte holding the weight of the object.
1 byte holding the length of the text describing the object.
The object description in ASCII.

It then follows that if the maximum description length is N, then each record will be N+4 bytes long. The system requires each record to be the same length so that a simple indexing system can be used. The maximum number of objects that can be stored is given by:
2048/(N+4)

If you specify a name length of 16 characters, there is enough room for 100 objects. In my experience this is sufficient for most adventures. You must tell the code the maximum length of the object names. This is held at location 49182. A length of 16 is assumed by default. You can change it either by POKING in the new value or using the SETUP routine in the code.

You must also tell the code how many objects are stored. This is held in location 849. You should remember that object 0 can be assigned so if you specify five objects, you can use objects 0 to 4 inclusive.

The code provides ten commands:

ISHERE

SYNTAX: SYS SA,OBJNO,LOCNO

The routine checks to see whether the specified object is at the specified location. If it is present, the location 846 contains 255 otherwise it contains 0. The following example is useful where an object must be present to allow an action (e.g. EXAMINE,EAT, KILL).

```
1000 SYS SA,OJ,LN: IF PEEK(846)=0 THEN PRINT “IT'S NOT HERE”: RETURN
```

Location 255 is used for carried objects so executing ISHERE with location 255 is useful to check if you are carrying something.

GETWT

SYNTAX: SYS SA+3,OBJNO

This routine extracts the weight of the specified object and returns it in location 847. Imagine that the weight carried out by you is in variable CW. The following code checks to see if you can TAKE an object, assuming that the maximum you can carry is 30 units:

```
1000 SYS SA+3,OJ: IF PEEK(847)+CW>30 THEN PRINT“THAT TOO HEAVY”: RETURN
```

TAKE

SYNTAX: SYS SA+6,OBJNO

This routine changes the location of the object to 255 which then adds it to your carried possessions. First of all it calls ISHERE and checks if the object is present. If the object is absent it exits with location 846 set as for ISHERE. If the object is present it takes it. Here are two examples, the second uses GETWT:

```
1000 SYS SA+6,OJ: IF PEEK(846)=0 THEN PRINT “I CAN'T FIND IT”: RETURN
0101 PRINT “TAKEN”: RETURN
1000SYS SA,OJ: IF PEEK(846)=0 THEN PRINT “I CAN'T FIND IT”: RETURN
1010 SYS SA+3,OJ: IF PEEK(847)+CW>30 THEN PRINT “IT'S TWO HEAVY”: RETURN
1020 SYS SA + 6,OJ: PRINT “TAKEN”: CW=CW+PEEK(847): RETURN
```

Since you want to check the weight of the object before taking it, ISHERE and GETWT were called first.

SETUP

SYNTAX: SYS SA+21,#OBJ,NL,COL1,COL2,BORDER,SCREEN

This routine sets up the working parameters:
#OBJ: number of objects
NL: object name length
COL1: normal text colour
COL2: highlight colour for inventory
BORDER: Border colour
SCREEN: Screen colour

DROP

SYNTAX: SYS SA+9,OBJNO,LOCNO

This is the reverse of TAKE in that it sets the objects location to the current location having first checked that you have the object. DROP also automatically clears the worn flag. Here is an example:

```
1000 SYS SA+9,OJ,LO: IF PEEK(846)=0 THEN PRINT "YOU DON'T HAVE IT": RETURN
1010 PRINT "DROPPED": RETURN
```

If you are using weights, another example is:

```
1000 SYS SA+9,OJ: IF PEEK(846)=0 THEN PRINT "YOU DON'T HAVE IT": RETURN
1010 SYS SA+3,OJ: CW=CW-PEEK(847): PRINT "DROPPED": RETURN
```

WEAR

SYNTAX: SYS SA+18,OBJNO

This command sets the worn flag of the specified object. This allows you to specify that an object must be worn. For example, you need to wear gloves to pick up a hot object. WEAR checks to ensure that you have the object:

```
1000 SYS SA+18,OJ: IF PEEK(846)=0 THE PRINT "YOU DON'T HAVE THAT": RETURN
1010 PRINT "YOU ARE NOW WEARING IT": RETURN
```

ISWEARING

SYNTAX: SYS SA+27,OBJNO

This routine checks to see if you are wearing the specified object and returns a value in location 846.

PEEK(846)=255 if you are not wearing it

PEEK(846)=0 if you are wearing it

The previous example can be extended to stop you trying to wear something already worn:

```
1000 SYS SA+27,OJ: IF PEEK(846)=0 THENPRINT"YOU'RE ALREADY WEARING IT!": RETURN
1010 SYS SA+18,OJ: IF PEEK(846)=0 THEN PRINT "YOU DON'T HAVE THAT": RETURN
1020 PRINT "YOU ARE NOW WEARING IT": RETURN
```

LOOK

SYNTAX: SYS SA+12,LOCNO,PTYPE,ROW,(COL)

This routine prints the object present in the specified location. As in the first part of this series, there are two possible print formats:

PTYPE=0 prints the objects across the screen separated by commas. The printing starts at the specified row and a column value is not requred. PTYPE=1 prints the visible objects a s a table with its top left corner at the specified row and column. This allows the use of windows.

INVENTORY

SYNTAX: SYS SA+15,PTYPE,ROW,COL

This command prints the objects carried. The same format options as for LOOK are provided. Any objects which are being worn are shown in a different colour to highlight them.

MOVEIT

SYNTAX: SYS SA+24, OBJNO,LOCNO

This routine moves the specified object to the specified location. This is a general form of TAKE and DROP and alllows more exotic actions such as summoning something or making objects appear and disappear.

As usual I have included a simple editor. The only real comment to make is that you must use the setup option before starting work since it initialises the number of objects and name length. The view option allows you to step through the object table. You press any key to step onto the next object. I have not included an option to allow you to change the record size halfway through creating your data base. Again work out everything on paper before starting typing.

To help your use of the routines, I have included a trivial demo. This assumes that you are at location one so ensure that you set up the objects at that location. The routine assumes four objects with a name length of 16. This routine is quite primitive and *you* will have to remember the numbers of the objects.

See listing on page 89

Diskit 8

Improve the efficiency of earlier programs in the Diskit series with this memory clear routine.

By Les Allan

It has become obvious from correspondence that readers who have used programs presented earlier in this series, have discovered that the effects of the Turbo Cruncher were not as efficient as they should have been. The reason for this is that the clear memory not used by the program being crunched, is not empty.

Memory Clear, presented here, fills the C64s memory between $0800 and $FFFF with $00, i.e. the program clears the computers RAM.

This will ensure maximum efficiency in compresing code to produce a compacted file when turbo crunched in conjunction with the Turbo Cruncher program published in *Your Commodore* March 1987.

The program is simple to use and if you follow the instructions below you should have no problems crunching programs.

1) Load in MEM ALL CLEAR and RUN to fill memory between $0801 and $FFFF with $00.
2) Load in the program that you wish to crunch.
3) Reset the computer if required.
4) LOAD "MEM1",8,1 (May 1987).
5) LOAD "MEM2",8,1.
6) Type in the SYS call required. e.g. 10 SYS 2061 (if that's the start address).
7) SYS 828 to save memory.
8) The 2 files BOOT and MAIN are now a complete working copy of the program which can then be crunched.
9) If when the MAIN part is crunched it crunches to less than 154 blocks then the KERN part can be appended to this using the ONE PART MAKER routine.

Getting it all in

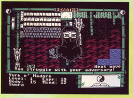
The program is presented here as a Basic Loader. This should be typed in using the Syntax Checker that can be found on the Listings page. When RUN this program stores the relevant machine code at a temporary address of $80000 and when prompted relocates the working program to Basic $0801 and SAVEs the program to disk.

See listing on page 77

Moebius and the Orb of Celestial Harmony

Honourable Origin's inscrutable approach to the chopping and churning world of oriental quests.

By Norman Doyle



```
                                   Heat wave
You struggle with your adversary!
Yurk o' Madore
Level:  1     Expr: 19
Body:  15     Mind: 12
Sword
```

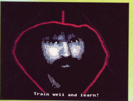
Here, on the once-prosperous, oriental paradise of Khantun, the platina of peace and prosperity of the Mandarins has been peeled away with the disappearance of the Orb of Celestial Harmony. The mind of Moebius, the Master of Magic, also known as Windwalker, has been clouded by the storms, droughts and earthquakes which now shatter the celestial serenity which was once the island's preserve.

The renting of the bamboo curtain separating the realms of Earth, Water, Air and Fire has diminished the Windwalker's power and new, evil forces now rule the domain. Evil monks, assassins and palace guards have breezed in on the wind of change, whipped into a galling gale by the self-styled Warlord of the East Wind.

Moebius, immobilised by the missing Orb, must mobilise a martial arts master to march against the malevolent masses. A novice must be found who can cross the boundaries between the realms, wreaking havoc on the forces which bind the Orb to its new owner. Any takers?

For the first time, the rather crude but clever graphics which have been a hallmark of Origin games, such as the Ultima series, have been overhauled and a new level of realism has been injected. I admit that by current martial art standards the game lacks the fluidity of Fist and International Karate, but it is the strategy of the battle which is the central core of this conflict.

As a novice, the player must be trained to overcome the assassins and guards who police the new state. Only mastery in the three skills of unarmed combat, sword fighting and



divination will allow the character creation menu to include an entry to allow you to venture forth.

As a lowly acolyte of unproven prowess and no experience, you start the adventure with 100 sips of water, 100 bites of food, a low degree of mindpower and minimal strength. Alone in the realm of Earth, you must fight to free the monks of Moebius and restore them to their duties in the shrine.

Movement is difficult, as much of the land is overgrown and you must cut a swath with your sword to enable your character's icon to wander across the symbolic map. As you journey, the palace guards will be called to the attack and assassins will attempt to creep up on you. Creatures of the forest will also molest you but they may also yield some precious ingredients for the spells which are essential to victory.

Other wanderers inhabit the forest. These are the villagers who will help a friendly traveller with gifts of food or advice. Approaching a peasant with your sword drawn will inhibit any communication and thereby damage your Karma.

Karma is measured by a split in a Zen symbol which is on the screen all the time and gives a measure of your purity. Similarly, dexterity is measured by a pair of wings which gradually migrate towards each side of the screen as you are preyed upon by a thieving guard, attacked by an animal, struck by an assassin's shuriken or singed by an evil monk's fireball.

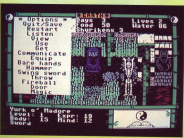
Your progress is followed by Moebius' omnipotent gaze, and when he is pleased with your progress, he will increase your body and mind potential while returning your karma and dexterity to full unity. When exceptionally pleased, he may even bestow a spell upon you.

Using brain, brawn and magic, the novice grows in manhood as he progresses from realm to realm until the final, firey fury of the confrontation with the Warlord himself.

My one major complaint is the heavy use of the keyboard for issuing the single keypress commands. This is fine for opening doors and picking things up, but it does inhibit the fight scenes when you're groping for the correct key to kick, punch or whatever. The fight scenes could be generally better but they're challenging enough to inhibit your progress which is their main purpose. At times the number of assailants make this feel like Gauntlet – the daunting battle against innumerable foes.

Moebius is a cut above most strategy games, allowing a degree of interaction which is, graphically superior to anything I've seen from the States. Perhaps the interchange of personnel and ideas which is currently taking place between Origin and Microprose's British and American units will benefit the arcade elements in strategy games. Certainly a touch of Exploding Fist would have given this unassailable universal appeal instead of just being a great strategy game.

Touchline:
Title: *Moebius and the Orb of Celestial Harmony.* ***Supplier:*** *Origin Systems, Microprose, 2 Market Place, Tetbury, Gloucestershire GL8 8DA.* ***Tel:*** *0666 54326.* ***Machine:*** *C64.* ***Price:*** *£19.95 (disk).* ***Originality:*** *7/10.* ***Graphics:*** *7/10* ***Playability:*** *9/10.* ***Value:*** *9/10.* YC



```
Days  3            Lives 2
Food  50           Water 86
Shurikens 3

Yurk o' Madore
Level: 1   Expr: 19
Body:  15  Mind: 12
Sword
```

A Change of Face

If MPS803 printouts are not the prettiest sight you've seen, Printkit IV could be the cosmetic surgery you've been looking for.

By Gordon Hamlett

Your MPS803 printer may be fine for dumping off listings and the like but it's not going to impress your bank manager too much when you use it to write that grovelling letter to him. To be perfectly blunt, the typeface looks awful. The lack of true descenders renders the print difficult to read; you keep wondering why a number '9' seems to be printed every time there ought to be a letter 'g'.

Enter Printkit IV from Avon Printer Technology. Not only does it give you proper descenders, but also other features such as italic and bold typefaces and underlining.

The package contains two integrated circuits and two sockets, a resistor, a switch and some solder mop. As the name suggests, it comes in kit form and you must fit it for yourself. To do this you'll need to strip the printer down, remove the printed circuit board, fit the components and then reassemble everything. Tools required include a small soldering iron, wire cutters and a couple of screwdrivers. The whole job could take you a couple of hours.

The instructions included are clear and fully explanatory. Your attention is drawn to the tricky parts and hints and tips are given to help you. The accompanying diagrams are similarly clear and large.

If you don't feel happy about approaching this job yourself, then you can send your printer to APT who will do the conversion for you for a fee of £15.

Once the kit is fitted, you are ready to try out the new facilities available to you. Naturally, the descenders are always there and need no special commands but underlining, italics and boldface are switched on and off via special control codes. When using word processors, you'll find that most of them will allow you to use these commands in your text. Included amongst these are the three most popular word processors for the C64, Superscript, Easyscript and Tasword 64.

Bold is effected by a double strike which does not slow the printer down in any way. The descenders make the most obvious difference to your text and, if you intend to send out a lot of letters, the package is worth having for this alone.

The italic script looks a bit disjointed, as if someone has just taken the ordinary text and stretched it across. Because of this, it is probably best only to print the odd word in italics for emphasis rather than italicising whole chunks of text at a time. It does give you five new characters though: left and right curly brackets, a divide sign, a copyright symbol and a right pointing arrow.

Bold can also be used for word emphasis but would be especially useful for those extra special letters to your bank manager though the extra wear put on your printer ribbon by using this mode should be borne in mind.

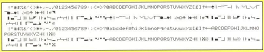
Underlining is best used in conjunction with capital letters. Otherwise, it tends to run into the descenders that have been so lovingly created. Spaces can be underlined, or not, depending on the effect you wish to create.

The switch allows the original printer mode to be restored at any time, although the manufacturers are convinced that you will not want to do this very often except as a reminder of the bad old days!

These four additional features will certainly give your MPS803 a new lease of life, and at £30, has got to be a lot cheaper than buying a new printer!

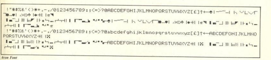
Touchline:

Product: *Printkit IV.* ***Supplier:*** *Avon Printer Technology, Swindon House, 4 Howard Road, Southville, Bristol B53 1QH.* ***Tel:*** *(0272) 667167.* ***Price:*** *£30.*



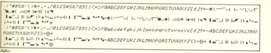
Commodore Font

```
 !"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[£]↑←
 !"#$%&'()*+,-./0123456789:;<=>?@abcdefghijklmnopqrstuvwxyz[£]↑←ABCDEFGHIJKLMNO
PQRSTUVWXYZ
ABCDEFGHIJKLMNOPQRSTUVWXYZ
```



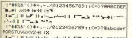
```
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[£]↑←
!"#$%&'()*+,-./0123456789:;<=>?@abcdefghijklmnopqrstuvwxyz[£]↑←ABCDEFGHIJKLMNO
PQRSTUVWXYZ
ABCDEFGHIJKLMNOPQRSTUVWXYZ
```

Avon Font



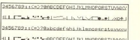
```
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[£]↑←
!"#$%&'()*+,-./0123456789:;<=>?@abcdefghijklmnopqrstuvwxyz[£]↑←ABCDEFGHIJKLMNO
PQRSTUVWXYZ{}÷®→
ABCDEFGHIJKLMNOPQRSTUVWXYZ{}÷®→
```

Italics



```
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEF
!"#$%&'()*+,-./0123456789:;<=>?@abcdef
PQRSTUVWXYZ
ABCDEF
```

Bold



```
3456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXY
3456789:;<=>?@abcdefghijklmnopqrstuvwxy
ABCDEFGHIJKLMNOPQRSTUVWXY
```

Underline

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What programs are available?

At the top of each article you will find a strap containing the article type, C64 Program etc. So that you can see which programs are available on which format, you will also find a couple of symbols after this strap. The symbols have the following meaning:

📼

This symbol means that the program is available on cassette.

💾

These programs are available on disk.

Please Note

Since the programs supplied on cassette are total working versions of the program, we do not put disk-only programs on tape. There is no sense in placing a program that expects to be reading from disk on to tape.

JULY 1987

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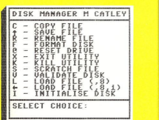
Disk Manager

Get organised with this handy disk utility program.

By M.E. Catley



```
DISK MANAGER M CATLEY

C - COPY FILE
↑ - SAVE FILE
R - RENAME FILE
F - FORMAT DISK
@ - RESET DRIVE
X - EXIT UTILITY
K - KILL UTILITY
S - SCRATCH FILE
V - VALIDATE DISK
L - LOAD FILE (,8)
← - LOAD FILE (,8,1)
I - INITIALISE DISK

SELECT CHOICE:
```

Imagine this – a C64 where disk commands are just one or two key presses away. A Copy or Rename command that prompts you to input the old and new filenames, instead of having to remember "is it oldfile=newfile or newfile=oldfile". *And* a Format command that requests a disk name and i.d. *And* the ability to load a machine code program at any time without having to NEW the computer afterwards. A Scratch command that tells you automatically how many files have been scratched. The ability to validate or initialise the drive with automatic confirmation of success or failure. No, not the CBM DOS 5.1. program supplied by Commodore which only goes part way to providing these facilities.

Disk manager is a disk utility program that gives you all these facilities although there are a few drawbacks. Commands which are available include:

C - Copy File
↑ - Save File
R - Rename File
F - Format Drive
@- Reset Drive
X - Exit Utility
K – Kill Utility
S - Scratch File
V - Validate Disk
L - Load File (,8)
← Load File (,8,1)
I - Initialise Disk

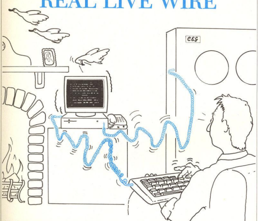
When the code is in memory, it is activated by 'SYS 53000'. This will not appear to do much, but will divert the IRQ call that occurs 60 times per second to point to our routine. The only effect this has is to check the keyboard for the CBM and *control keys being pressed simultaneously.* If they are not pressed, then the standard IRQ routine is carried out, and the computer functions normally.

If the CBM/control keys are pressed together, any program running is temporarily suspended, (it will resume after exiting the utility), the screen and colour memory are stored under the BASIC ROM, and a window is opened on the screen displaying the commands available with an input/outut line for commands, responses and errors. Now all the commands are just one key press away.

Follow the on-screen prompts and disk house-keeping becomes simplicity itself. X will exit the utility, while K will restore the IRQ vectors back to normal, in which case another 'SYY 53000' call will be required to re-activate the facility.

True to life, you get nothing for nothing, and there are a few minor restrictions. Your program must not use the memory under the BASIC ROM, or from 51580 to 53247 ($C97C-$CFFF) and the utility assumes the normal character set at the screen default location of 1024 ($0400). The utility will not work with any graphic screen or mode.

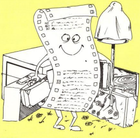
See listing on page 78


CEG

Relocator

Reload programs anywhere in memory with this handy utility program.

By William Sellers



The relocator is a utility for the serious programmer. It allows programs which have been saved to cassette or disk to be set to reload at any required memory location. Consequently, it allows a program to be loaded to any location – ignoring the start address given on the header. Saving to tape can also be protected so that the program cannot be reloaded at a different start address by ordinary Commodore routines, although obviously this utility copes with this sort of protection. All information on the tape header is displayed and the presence of a data file or a protected file is indicated.

The program is designed to help in the creating of auto-start programs that need to reload in the area of memory below $0400 and for saving data that needs to reload underneath the KERNAL ROM at $E000 to $FFFF. These are fairly easy to do for disk users since program files can be written byte by byte as data fields but are not possible for cassette users with standard save routines.

How it works

The program works by calling the individual ROM routines involved in saving or loading a program instead of simply using the standard KERNAL routines. This allows custom headers to be created so that the reload address is under independent control. It also enables headers read in to be ignored completely so that new start addresses can be set.

Getting it in

The program is presented as a BASIC program which POKEs the machine code program into memory from $0801 to $106C and then saves this chunk of memory to disk (tape users need to make the changes indicated in the listing) as the program 'RELOCATOR'. It is this second program that is used. For the BASIC program to run, it is necesary to initially move up the start of BASIC, so that there is room for the new program. This needs to be done before the program is typed in and is achieved by typing:

'POKE43,1:POKE44,32: POKE8192, 0:NEW'

There is an error check on each line, but care should be taken to save a copy of the BASIC program before it is RUN.

The Program

Reset the computer and load 'RELOCATOR' from tape or disk. When it has loaded, simply type 'RUN'. The program is completely menu-driven and is very simple to use. The available options are: tape load; protected tape save; unprotected tape save; disk load and disk save. For the Load options you are prompted for a name (optional for tape) and a start address in hexadecimal. After the load, the old and new start and end addresses are displayed. For the Save options you are prompted for the start and end addresses of the area of memory that you require to save and the start address that you wish it to reload at. Again, after saving, the old and new start and end addresses are displayed.

See listing on page 85

Tech Troubles

Don't suffer in silence. Let Tim Arnot help you out with your technical problems.

By Tim Arnot

Dear Tim

This might sound like a strange enquiry, but we are hoping you will be able to solve one of our problems that we have come up against.

Could you tell me what is required to use a PET dual disk drive with a CBM 64. I understand that a couple of POKE commands may be required.

We are not in a position to use this setup until we have solved this problem.

Mark Powell, Shrewsbury College of Arts & Technology.

Hi Mark,

Connecting a PET dual disk drive to a Commodore 64 is not quite as straightforward as you think. There is an obvious difference in that the connector on the back of the 64 is a six pin din, and the connector on the disk drive is a 36 pin IEC socket. The main reason for this is that the PET used an IEEE-488 interface to talk to its peripherals, whereas the 64 has a proprietry serial bus. The 'PET to IEEE' cable supplied with the drive looks like it might plug into the user port on the back of the 64, however, even though it fits, it will not work.

In 1982, when Commodore were designing the VIC-20 (the forerunner to the 64), they decided they needed to cut costs and use readily available cabling for the peripheral interface. This was prompted by the fact that the sole supplier of PET to IEEE cables had just won a large defence contract and couldn't supply for several months. So, a fast serial cable was invented, that still used the IEEE protocol for software compatibility. Unfortunately, there were flaws in one of the major chips, and faced with the choice of Jack Tramiel's wrath or slowing the system down chronically, the engineers chose the latter option and whistled quietly.

After the history lesson, back to your problem! You will need to convert the serial bus format into a parallel IEEE format. There is no simple way to do this other that by buying a proprietry interface. The one I normally recommend is made by Brian Boxes (051-220 2500) and costs £69.95 + VAT. It plugs into the cartridge port of the 64 (or 128), but has a feed through connector so that cartridges, memory, modem, etc, can still be used.

Dear Tim,

Can you please help?? I have just bought a Sony portable T.V. for my C64 & would like to know how to connect up the 21 pin SCART plug from the T.V. to the audio/video socket on my C64. In the users manual it shows a 5 pin socket, but on my C64 it has an 8 pin socket. could you please give the appropriate connections from the SCART plug to the audio/video socket.

Steve Norman, Shepton Mallet.

Hi, Steve,

The original Commodore 64s were shipped with a 5 pin A/V socket, but later ones have the 8 pin socket. The pinout for the 8 pin version is as follows:
1 – Luminance/Sync
2 – Ground
3 – Audio Out
4 – Composite Video
5 – Audio In
6 – Chroma
7 – N/C
8 – N/C

The pinout for the SCART socket is as follows:
1 – N/C
2 – Audio I/P
3 – N/C
4 – Audio GND
5 – Blue GND
6 – Audio I/P
7 – Blue
8 – N/C
9 – Green GND
10 – N/C
11 – Green
12 – N/C
13 – Red GND
14 – N/C
15 – Red
16 – Fast Blank
17 – PAL GND
18 – Fast Blank
19 – N/C
20 – PAL
21 – Screen

The simplest way to connect the two together is to join all the ground connections on the SCART plug together and take them to the ground on the 8 pin DIN. Then connect the Composite output to the PAL input (pin 20) and the audio output to both of the audio inputs. The other connections are for an analogue RGB output, as produced by the Amiga.

Dear Tim,

Computer: Commodore 64 (oldish).
Disk: Commodore 1541C.
Printer: OKI Microline with Super Speed RS-232C board.
Interface: Interpod.

If I could get the above to talk to each other I could have printed this letter, but then I wouldn't have needed to would I!

I have wired up the interface cable (printer/interpod) using the following connections, but nothing happens when I direct output to the printer as instructed on page five of Interpod.

Printer

1	*Ground*
3	*RD*
20	*DTR*

Interpod

Ground	*1*
Tx Data	*2*
RTS	*4*
CTS	*5*
DCD	*8*
DTR	*20*
RI	*22*

As you can see, this is using Ready/Busy protocol, which is acceptable to the printer.

I also have an Interfaker, not that I really know how to use it! When I connected it in line between the printer and interface the DTD light (on the Interfaker) came on when the Interpod powered up. Does this mean that I'm nearly there?

I have included copies of as much documentation as I think might be helpful and I really would appreciate any help or recommendations you can give me.

Keith Foster, Gateshead

P.S. I thought the articles on disk drives and the RS-232C interface excellent reading. Please let's have more along familiar lines.

Hi, Keith,

Thanks for your comments on the magazine. I am sure the editors are duly chuffed.

Connecting two RS-232 devices is always a difficult and traumatic time. I don't think I have ever come across an RS-232 system that worked first time around. The connections you have made should work in theory, and the fact that the printer is sending DTR positive indicates that it is waiting for data.

The first thing you want to check is that you have the printer dip switches set correctly, i.e. SW1-4 is on, and both SW1-7 and SW1-8 are on. This selects the ready/busy protocol and uses DTR for busy control. Also check your wiring is really as you think it is.

Assuming all that to be OK, it could be that the interpod is interpreting the CTS high as busy. You can easily check this by using SSD from the printer for busy and reversing switches 7 and 8.

Being remote from the situation, that's really about all I can suggest. However I'll leave you with the thought that if you know what you're doing, there's a lot of money to be made in the consultancy business – setting up peoples RS-232 ports.

Eight Speed Scroller

Learn the art of smooth scrolling with this handy program.

By Richard Ikin

The routine I have presented here is a hardware scroll routine for the Commodore 64. It is an 8 speed, 8 directional scroll routine. The two speeds (horizontal and vertical) are set at 1 pixel, however these can be altered by changing XSPEED or YSPEED in the assembly language program or by breaking out of the program (after running the basic loader) by using RUNSTOP/RESTORE and poking the two locations shown below.

The routine works by altering the hardware scroll registers whenever the joystick is used and changing a pointer to the top left of the screen in memory when needed. The screen contents are not moved by a software scroll as usual but the screen is taken from the map and printed onto the video matrix.

The routine is a very smooth hardware scroll routine. I use this routine myself in my own games so I know it works.

Use a joystick in port 2 to scroll the screen. None of the ROMS are switched out, therefore you may notice them on screen as you will all 64K (in 1K sections) printed on screen and ROMS switched out to eliminate this.

The scroll moves in the opposite direction to the way the joystick is moved, as it would in a game, i.e. to scroll left, move the joystick right.

The routine presented here is not really a complete program for you to use. What it does do is illustrate how you would produce sugh a routine for your own programs.

The Program

The eight speed scroller is presented both as a Basic program in the form of a series of data statements, and as an assembler listing.

As you can see from the assembler listing, the first task is to set the raster interrupt. This is what the 'setint' routine does. It also switches the Vic chip to look at memory locations 16384 to 32767 instead of the default (0-16383).

You may notice that the program does not switch out any of the ROMs. The Basic ROM can be switched out by clearing bit 0 of location $0001. However, if you do this you must change the RTS in line 998 to an endless loop, as the RTS will cause a return to Basic and as you have just switched Basic out this will cause nasty problems.

OK, whenever a raster interrupt is generated, the 64 will divert its attention to the interrupt routine. The first thing that should be done when the routine is entered is to check the direction of the scroll. This is held in the variable 'way'. If you look at lines 6160 to 6174 in the assembler listing you will see what values need to be in 'way' to cause scrolling. As you can see, a zero will cease all scrolling.

When the direction has been decided and appropriate action taken, the raster split is processed. The comments in the assembler listing explain what action is taken.

Lines 1741 to 2620 are the four routines that perform the actual hardware scrolling of the Commodore screen. These are the routines that provide the smooth part of 'Smooth Scrolling'

As you may know, the Vic II chip can alter the horizontal and vertical position of the screen with up to eight vertical and eight horizontal positions. Therefore to achieve smooth scrolling we must:

a) alter the scroll register until it reaches its maximum or minimum value.

b) when this point is reached we must change the address of screen (2) in the map.

After every second interrupt the contents of screen (2) are displayed on screen (1). If you look at the 'window' routine you will see that the section of memory/addressed by the 16-bit value 'map' is loaded into the video matrix at 17408.

The contents of 'map' is the address on the top left corner of screen (2) in the map. Screen (2) is an exact replica of the screen you see when you look at your TV. All it does is point to the data which is displayed on screen.

As the routine will scroll through the whole 64K of the Commodore's memory you will at times no doubt see some pretty weird data printed up on the screen. This is because none of the ROMs are switched out and what is being printed up is the ROMs working storage areas being displayed on the screen. When you set a limit to the size of the scrolling area and switch the Basic ROM out, none of this occurs.

The control routine is a fairly standard routine and can be replaced by your own, as long as you store the correct values in 'way'.

The speed of scroll is set by the value in 'Xspeed' and 'Yspeed'. The value should not be less than one and not more than seven. They are independent of each other.

In the future I will add a routine to set the size of the scrolling, and will also present any further alterations that I make. I would be interested to see anybody else's ideas.

See listing on page 91

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- Transfers multistage tape programs to disk – more than any other cartridge – even the extra stages are turbo load – a unique feature.
- Sprite Killer! make yourself indestructible by disabling Sprite collisions in games.
- Fast disk format (20 secs).
- Built-in unstoppable reset button.

PLUS Built In

FASTLOADER

Action Replay III even has a built in disk fast loader which speeds up loading 5 times. Uses no memory – invisible to the system. You could pay £20 alone for this feature.

WARP*25

BREAKS THROUGH THE 10 SECOND BARRIER!

Action Replay III now comes with an amazing new Disk Bootloader that will reload your backups at TWENTY FIVE TIMES normal speed. The fastest disk turbo yet devised!! There are NO CATCHES 'WARP*25 works with ALL your games. Works with any disk drive. No preload required – No hardware modifications necessary – No user knowledge required – programs load INDEPENDENTLY. LOADING TIME – 9.8 SECONDS (for a typical game saved by WARP*25 in conjunction with ACTION REPLAY III). This time is for the COMPLETE load process from start to finish. Reload is entirely INDEPENDENT of the cartridge or any other hardware.

Compare these (accurate!) figures for some rival backup systems:

SYSTEM	LOAD TIME	PROGRAMS PER DISK	CARTRIDGE REQUIRED?
ACTION REPLAY MK III SAVED WITH NORMAL TURBO	25 SECS	THREE	NO
ACTION REPLAY MK III SAVED WITH WARP*25	9.8 SECS	THREE	NO
FREEZE FRAME (MK IV)	40 SECS	TWO OR THREE	NO
FREEZE FRAME (LAZER)	25 SECS	TWO	YES
EXPERT SYSTEM	30 SECS	THREE	NO

All purchasers of Action Replay III will receive WARP*25 FREE with their cartridge. Existing Action Replay III owners can obtain WARP*25 Disk turbo by sending £2.50. post free. (No need to send your cartridge). OR obtain it FREE on the Enhancement Disk (£7.95).

THE ACTION REPLAY ENHANCEMENT DISK

The best collection of tape to disk transfer routines for nonstandard multiload programs (eg Dragons Lair I and II, Championship Wrestling, Summer Games, Ace of Aces, Gauntlet, Supercycle, Marble Madness, World Games). 31 titles in all. Uses our unique parameter system. No user knowledge required. Turboload throughout. NOTE: Standard cartridge transfers normal multiloaders eg Winter Games etc. etc. Disk includes file copy and disk backup utilities.

PRICE £7.95 with FREE! Multicolour Slideshow for display of loading screens, hires pictures etc. saved by Action Replay. Great entertainment!

PERFORMANCE GUARANTEE

100% Success? Rival Claims? Who's Kidding Who?

Action Replay Mk III will backup any program which any other cartridge can backup – and more! It also has an unmatchable range of features. Consider 'Freeze-Frame' for example, which uses more disk space, saves at slower speed, has slower tape loader, has no built in disk fastloader, no picture, Sprite or restart features and costs £10 more than Action Replay. So who's kidding who? Buy Action Replay Mk III. If you find that it does not live up to our claims return it within 7 days of receipt and your money will be refunded.

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Save wear and tear on your Expansion Port

☐ Accepts 3 cartridges. ☐ Onboard safety fuse.
☐ Switch in/out any slot. ☐ High grade PCB.
☐ Fully buffered. ☐ Reset button.

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☐ Quality Commodore compatible data recorder.
☐ Pause control. ☐ Suitable for 64/128.
☐ Counter. ☐ Send now for quick delivery.

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Now you can have an 8K or 32K cartridge that you program like RAM then acts like ROM!

☐ 8K or 32K pseudo ROM.

☐ Battery backed to last up to 5 years (lithium battery).

☐ Simply load the program you require — then flick the switch. The cartridge can then be removed just like a ROM cartridge.

☐ Make your own cartridges including autostart types — without an EPROM burner.

☐ Can be switched on or off board via software.

☐ I/O 2 slot open for special programming techniques.

☐ 32K version has 4 x 8K pages.

☐ Some knowledge of M/C is helpful — but full instruction are provided.

8K VERSION £14.99
32K VERSION £29.99

SMARTCART UTILITIES

A series of utility programs for use with Smartcart. Simply load in the program and you have a powerful cartridge. When you have a different requirement — load in another program and you have a new cartridge. The process takes seconds, and can be repeated any number of times.

We intend to release a range of programs. The first available are:

DISKMATE II

☐ all the features of Diskmate II (see ad).

Loaded in seconds — with full instructions. ONLY £9.99

PRINTER IV

Now you can turn your MPS 801 into 4 printers in one!!

☐ Alternative character set ROM — fitted in seconds.

☐ All four sets have true descenders.

☐ 100% compatible with all software.

☐ Descender. ☐ Eclipse.
☐ Scribe. ☐ Future.
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☐ Loads most programs at 5-6 times normal speed.

☐ Saves at 5-6 times normal.

☐ Improved DOS support including 10 sec format.

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☐ Return to normal kernal at flick of a switch.

☐ FCOPY — 250 block file copier.

☐ FLOAD — special I/O loader.

☐ Plus lots more.

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☐ A fully icon/menu driven graphics package of a calibre which should cost much more.

☐ Complete with a fibre optical lightpen system for pin point accuracy.

☐ Multi feature software including:

- Range of brushes
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- Circle
- Rubberbanding
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☐ Blazing Paddles will also work with many other input devices including: Joysticks, Mice, Graphics Tablets, Trackball etc.

☐ Pictures can be saved from Action Replay and edited with Blazing Paddles.

Complete Blazing Paddles & Lightpen ONLY £24.99

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The ultimate disk toolkit for the 1540/1541

☐ A disk toolkit is an absolute must for the serious disk hacker. Toolkit IV has more features than most for less.

☐ DISK DOCTOR V2 — Read and write any track and sector including extra and renumbered tracks. Repair damaged sectors. Look underneath read errors.

☐ HEADER/GAP EDITOR — Decodes and displays ALL header information including off bytes and header gap. Rewrite the entire header and header gap. Renumber sectors. Also edit any sector tail gap.

☐ DISK LOOK — Sort directory. Recover lost files. Display file start/end addresses. Disassemble any file program directly from the disk to SCREEN or PRINTER including undocumented opcodes. Edit Bam. Much, much more.

☐ FILE COMPACTOR — Can compact machine programs by up to 50%. Saves disk space. Compacted programs run as normal.

☐ FAST DISK COPY — Copy an entire disk in 2 minutes or less using single 1541.

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☐ FORMATTER — 10 second format an entire disk or format any individual track or half track 0 to 41. Redefine any of 30 parameters to create or recreate unique disk formats.

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RAM DISK

☐ Turn your Smart Cart into a 32K RAM/disk.

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☐ Load/save instantly.

☐ Disk type commands: load, save, directory, scratch.

☐ Program data retained when computer is switched off!

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Model & Robot Control made easy

☐ Robotek 64 is a comprehensive hardware/software package which enables you to connect your 64/128 to the outside world.

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☐ Analogue input with full 8 bit conversion.

☐ Voice input for voice control.

☐ Software features:- test mode/analogue measurement/voice activate/digital readout etc.

☐ Excellent value! ONLY £39.99

including hardware/software/mic etc. (State tape or disk)

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☐ The new sampler allows you to record any sound digitally into memory and then replay it with astounding effects.

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☐ Now with full sound editing module to produce outstanding effects.

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☐ Powerful sequencer with editing features.

☐ Load/save sample.

☐ Up to 8 samples in memory at one time.

☐ Tape or disk (please state).

☐ Complete software/hardware package £49.99

☐ Com-Drum software is available separately at £9.99 to turn your Sampler II into a Com-Drum system as well as a sampling system.

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☐ Now you can turn your computer into a digital drum system. ☐ Hardware/software package.

☐ 8 digital drum sounds in memory at one time.

☐ Complete with 3 drum kits.

☐ Real drum sounds — not synthesised.

☐ Create superb drum rhythms with real and step time. ☐ Full editing. ☐ Menu driven.

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☐ Load/save facilities. (state tape or disk)

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☐ 24 drum sounds supplied on disk to enable you to construct your own drum kit.

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☐ 8 sockets to accept upto a 32K EPROM in each.

☐ On board operating system — no programs to load.

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☐ Fully menu driven on power up.

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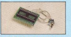

4 WAY KERNAL BOARD

☐ This board fits in place of the kernal in your 64 and accepts a 16K or 32K replacement kernal giving 2 or 4 different operating systems.

☐ Just flick the switch supplied to select between systems.

☐ This is a carrier only — ready to accept your own chip.

☐ Now you can have all your different systems available at one time.

☐ Full instructions. ☐ Fitted in minutes.

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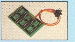

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☐ A multi carrier board accepts up to 3 chips.

☐ Fits in place of original kernal of 64.

☐ Three sockets — one for the original kernal plus two others each accepting a 16K chip — that's 5 operating systems available at the flick of a switch!

☐ Fitted in minutes.

☐ Full instructions.

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☐ The most powerful disk nibbler available anywhere, at any price!

☐ Burst Nibbler is actually a two part system — a software package **and** a parallel cable to connect the 1541/1570/1571 to 64/128 (state type).

☐ What gives Burst Nibbler its power? Conventional nibblers have to decode the data from the disk before it can transfer it using the serial bus — when non standard data is encountered they are beat. Burst Nibbler transfers data as raw GCR code via the parallel cable without the need to decode it so you get a perfect copy of the original.

- ● Will nibble upto 41 tracks. ● Copy a whole disk in under 2 minutes. ● Full instructions.
- ● Regular updates — we always ship the latest. ● Fitted in minutes — no soldering usually required.
- ● Full or ½ tracks. ● No need to buy parallel cable if you have Disk Demon/Dolphin etc.
- ● Cable has throughbus extension for other add ons.

☐ Whether to choose FastHack'em or Burst Nibbler? Fast Hack'Em is unbeatable value as an "all-rounder" — with nibblers, 1 or 2 drive copy, format, file copy, 1571 copy etc. etc., so if you have a more general requirement perhaps FastHack'Em is for you. Burst Nibbler is a pure nibbler second to none, for the reasons stated. So if it's just making backups you are interested in, there is no other product to beat it.

ONLY £24.99 COMPLETE

SOFTWARE ONLY £12.99 CABLE ONLY £14.99

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☐ Fits into user port for maximum compatibility with cartridges/Superom Board etc.

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☐ We believe Eprommer 64 is the most comprehensive, most friendly and best value for money programmer available for the 64/128.

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☐ Comes complete with instructions — plus the cartridge handbook.

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DATEL ELECTRONICS

PROFESSIONAL DOS ™ MIKROTRONIC

£64.99 POST FREE with Disc Demon operating system

"The world's fastest parallel operating system"

- ☐ Loads a typical 202 block program file in under 3 seconds!
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PLUS AN ADVANCED COMMAND STRUCTURE INCLUDING:

- ☐ Fast format – up to 40 tracks (749 blocks).
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- ☐ Fload will fastload files up to 250 blocks (other similar systems will only cope with 202 blocks).
- ☐ Number conversion. ☐ Reset.
- ☐ Unique built in file copier will copy files up to 250 blocks like lightning – multiple copy options – perfect for copying Action Replay files.
- ☐ Highly compatible with commercial software – can be switched out for non compatible programs.
- ☐ Perfect for use with Action Replay 3 – a typical AR3 backup will reload in about 3 seconds – yes 3 seconds!
- ☐ Speeds up other DOS functions including verify, scratch etc.
- ☐ Comes complete with superfast file and whole disk copier free!
- ☐ Screen on or off during loading.
- ☐ Enhanced command set – over 30 new commands.
- ☐ Easily fitted – Disk Demon plugs inside the 1541 and the new operating system chip plugs inside the C64/128. Fitting takes only minutes and usually requires no soldering.
- ☐ User port throughbus supplied free – you could pay £15.00 for this alone.
- ☐ Supplied complete – no more to buy.
- ☐ Works on C128/1541 in 64 or 128 mode.

C128 version £69.99

BLUE CHIP DRIVE

● **Fully C64/128 compatible.**

- ☐ At last a top quality drive at a sensible price.
- ☐ Super slimline case
- ☐ External power supply for cool operation.
- ☐ Direct drive motor.
- ☐ Supplied complete with all cables – no more to buy.
- ☐ This drive is now probably the most compatible drive available for the Commodore. More so than even Commodores own '1541C. Much more so than other so called compatibles. In fact we have been unable to find a program including the latest that would not work. (At time of Press).
- ☐ **No need to look elsewhere – this is the best.**

ONLY £139.99 POST FREE

(If you require courier delivery add £5.00).

ULTRA CRUNCHER

● **The ultimate cartridge based program compactor.**

- ☐ Compacts by upto 30%!
- ☐ More programs for disk.
- ☐ 3 compacting programs on one cartridge.
- ☐ Fast loading/saving routines – works with Disc Demon.
- ☐ Can even further compact AR III files!
- ☐ 250 block file copy function.
- ☐ Full DOS support including fast format.

ONLY £12.99 on cartridge. Available as chip only for 256K Superom Board for only £7.99

FAST HACK'EM ™

● **Multi Module Disk Nibbler – all on one disk.**

- ☐ Single 1541 Nibbler – Copy a disk in 2 minutes.
- ☐ Auto Nibbler – Copy an entire protected disk in 3 minutes.
- ☐ Super fast File Copy – Under 9 seconds typically.
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- ☐ **No other product is such a good "All Rounder" at this price its unbeatable.**

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DISKMATE II

The Disk Utility Cartridge

- ☐ Disk fastload cartridge.
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- ☐ Fast save. ☐ Fast format (10 secs).
- ☐ Improved DOS – single stroke commands – load/save/dir/old etc.
- ☐ Redefined function keys for fast operation of common commands.
- ☐ Powerful toolkit commands including: old/delete/merge/copy/append/autonum/linesave etc.
- ☐ Plus a full machine code monitor – too many features to list but it has them all!
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MIDI 64

A Full Midi Interface for the 64/128 at a realistic price

- ☐ MIDI in. ☐ MIDI thru. ☐ 2 x MIDI out.
- ☐ Compatible with most leading software packages including: Seil, JMS, Advanced Music System, Joreth, Steinburg etc.

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- ☐ CBM 64/128 mouse.
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- ☐ Functions on either joystick port.
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- ☐ 27128 **£3.00 EACH**
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- ☐ All the necessary parts to produce an 8K/16K auto-start cartridge.
- ☐ Top quality PCB. ☐ Injection moulded case.
- ☐ Reset switch. ☐ 16K EPROM.
- ☐ "Cartridge Handbook" gives full details and tips on building and configuring the cartridge for many uses.

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Spot the Ball

Win one of five videos of the 1966 World cup, plus a chance to see the European Championships Final.

Your Commodore is pleased to team up with Addictive Games in a superb competition based around their Football Manager II game.

On offer are five copies of the video of the 1966 World Cup, the one that England won.

Plus for the first correct entry pulled out of the hat is the chance to take part in a game of Football Manager II against three competition winners from other magazines. The overall winner of this game winning a trip to see the European Football Championship Finals in Munich in June 1988.

How to Enter

On this competition page you will find a photograph of some football action.

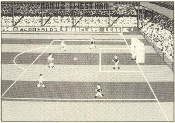
In the time honoured tradition the ball has been erased from the picture and it is up to you to point out where the ball is.

Study the picture carefully and mark with an X the position where you think the ball is.

Then complete the entry form and return it together with the picture to the *Your Commodore* editorial address. Closing date for the competition is December 31st 1987.

The Rules

Entries will not be accepted from employees of Argus Specialist Publications and Addictive Games. This restriction also applies to employees' families and agents of the companies. The How to Enter section forms part of the rules. The Editor's decision is final and no correspondence will be entered into.



Football Manager II Competition

Entry Coupon

Name ....

Address ....

....

....

Postcode ....

Post to: *Your Commodore*, Football Manager II Competition, 1 Golden Square London W1R 3AB. Closing date: 31st December 1987

Typro

Give your Plus/4 powerful typing and wordprocessing facilities.

By P.G. Simonds

The inbuilt wordprocessor of the Plus/4 is great for producing small notes or documents. However, when it comes to planning out large documents or tables it isn't really of much use.

Typro for the Plus/4 gives your computer advanced typewriting and wordprocessing facilities. The following is a list of some of the main functions that are offered by the program:

Each line is printed as you compose your document, either on a dot matrix printer or on a daisy wheel.

Line length can be set up to 164 characters; this is great when using the Commodore DPS 1101 daisy wheel, with end of line audible warning.

Characters can be printed in either cursor up, uppercase and graphics, or cursor down, upper and lower case, modes. Reverse can be used as well as normal text, facilities are also present to allow use of expanded characters if using a dot matrix printer.

If you are using the DPS 1101 daisy wheel printer you can access the double strike and underline modes.

Documents of up to 200 lines can be entered, subject to line length. With a document of 100 lines, line length, the full 200 text lines are available for use. The amount of memory left is shown in the single line menu mode.

Text and graphic (bit image) modes are available for normal or zero-spacing between lines on a dot matrix printer.

Wordprocessing modes include the ability to insert or delete lines, copy lines to another part of the document, review and edit modes as well as file saving and document merging modes together with full or part document printing facilities.

One major plus for Typro is that the whole program is written in Basic. This means that the program can easily be modified to work with cassette or to work with other printers. It may even be possible, with a little work, to make the program run on a C64.

Rather than simply giving a description of how to use the program, a detailed breakdown of the program is given, this should enable people with a little programming knowledge to alter it to suit their own requirements.

Initialisation

(1000 - 1070 and 2000 - 2080)

This section of the program initialises all of the variables required by the program – screen colours are also set here. This section of the program allows entry to typing mode (new page), loading of a disk file (old page) or to the full page menu.

Entry is made to this routine every time you RUN the program or the Commodore key and X are pressed in menu mode.

If a new page is started this routine will set the line length. A typing grid is also set up to assist with the planning of text layout. This mode also checks to see if the printer (device number 4) is switched on.

Typing (new page)

(1080 - 1690 and 3000 3120)

This routine assembles and then prints each new line as it is added to the bottom of the page in memory.

Entry to this mode is made by pressing 'C' from the main menu or after printing the previous line.

When this routine is entered for the first time the document width will be set. The new line will automatically be printed when it is full or if terminated early by pressing CLEAR/HOME.

After printing a new line, you must press either 'M' to enter menu mode or 'C' to enter a new line. Any other response will generate an audible tone.

Inverted commas can be used in the text. However, it is worth pointing out that some printers produce a control code at the end of a line that has an odd number of inverted commas on a line.

The following keys are used in this mode:

CLEAR/HOME – terminates a line and prints it.

ESC – Returns program to menu losing any text.

CURSOR LEFT – deletes a character.

CURSOR RIGHT – acts as space key.

Pressing CONTROL with one of the colour keys gives access to facilities such as underline, etc. Figure 1 gives details of all of these. You can see control codes at a glance since they are displayed as flashing, reverse field black numbers.

If you turn underline on or reverse field the text will be reversed on the screen.

Menu Mode

(4000 - 4290)

This is where you can select which part of the program that you want to go to. Entry to this section of the program is usually made by pressing M in other options. Entry can also be made by errors or tasks completing their operation. While in this mode the single line menu will display the memory available. The full screen menu can be entered by pressing 'H' while in single line mode. The text currently in memory can be deleted by pressing the Commodore key and 'X' at the same time.

Single Width or Strike	Double Width Or Strike	Line Spacing	Graphic Spacing	Reverse Or Underline On	Reverse Or Underline Off	Upper Case & Graphics	Lower Case & Capitals
A=15	A=14	B=15	B=8	C=18	C=146	D=145	D=17
Control 1	Control 2	Control 3	Control 4	Control 5	Control 6	Control 7	Control 8

Edit Mode

(5000 - 5310)

This section of the program allows you to alter a line of text that already exists within the program. Entry to this section is made by pressing 'E' while in the menu or review modes.

If you try to edit a line that does not exist you will return to the menu. Exit from this routine can also be made by pressing ESC as long as the text and control codes are unchanged.

When you enter this mode the existing text will be printed to the scree, together with a blank typing grid to allow you to retype the line. Should you only want to change the start and end of line control codes you can change them and then press the ESC key to use the old text with the new codes.

If the text or embedded control codes are to be changed the whole line must be rewritten. While typing an audible tone starts as you reach ten characters from the end of the line.

As with normal editing mode cursor left deletes a character, cursor right acts as space and clear/home terminates line entry. When editing a line the same routine is used as for line entry at 1080 - 1430 and the same control code display and delete routines at lines 1435 - 1600 and 1605 - 1690 are also used.

Printing

(6000 - 6210)

Entry to this section of the program allows you to print out the whole of the document or just a small part of it. Entry is made to this routine when you press 'P' while in the menu mode.

When in printing mode you can print the full document by pressing 'F' or simply part of it by pressing 'P'. Should you want to return to the menu you can do this by pressing 'M'.

Should you want to print a single line you can do this by making both the start and end lines for a partial print the same. Return to the main menu if the start of printing lines does not exist or if the end of printing is zero or less than the starting line.

Save File

(7000 - 7200 and 8000 - 8130)

Entry to this section of the program allows you to save the documents that you have entered to disk. Entry to the save mode is made by pressing 'S' when in the menu mode.

Should you enter save mode by mistake the 'N' key or entering a file name 'M' will return you to the main menu. The names of the files on disk can be indexed using a file name of 'I'.

Should you give a file the same name as one that already exists on the disk, the new file will overwrite the old one. When you save a document the page length, page width and commas/colon usage flag)variables N, W and S) are also saved.

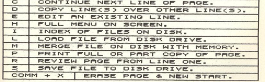
Each line of the document is saved in two parts. This is because retrieval of strings greater than 84 characters in length form disk or tape which can cause problems. Saving strings that include commas and colon causes problems, these are therefore substituted and translated before saving. Formatting of the strings so that they are ready for filing is done by the subroutine at lines 8000 - 8130. When a file is saved confirmation will be reuired if you have used commas or colons. A response of 'N' will save translation time when the file is read, however don't type 'N' if you want to use commas in this file.

Load file

(9000 - 9290)

This section of the program loads a disk file into memory, erasing any text already in memory. Entry to this section of the program is made by pressing 'L' when in menu mode.

Facilities to exit this routine and list files on the disk are the same as for



```
M E N U
A   ADD OR DELETE LINES.
C   CONTINUE NEXT LINE OF PAGE.
D   COPY LINE(S) OVER OTHER LINE(S).
E   EDIT AN EXISTING LINE.
H   FULL MENU ON SCREEN.
I   INDEX OF FILES ON DISK.
L   LOAD FILE FROM DISK DRIVE.
M   MERGE FILE ON DISK WITH MEMORY.
P   PRINT FULL OR PART COPY OF PAGE.
R   REVIEW PAGE FROM LINE ONE.
S   SAVE FILE TO DISK DRIVE.
COMM + X   ERASE PAGE & NEW START.
```

saving files. If the variable S, read from the text file, is set to 1 the file contains commas and colons. These will be translated after a file is loaded. This does increase loading time.

Review Document

(10000 - 10190)

This part of the program displays each line of the document with its embedded control codes and the end of line control codes. Entry to this section is made by pressing 'R' from the main menu.

While in review mode the cursor up and down keys are used to move up and down in the document. Should you want to move a little quicker the cursor left and cursor right keys move you ten lines up and down. If a line is to be changed you can go straight to edit mode by pressing 'E'. The menu is accessed as normal by pressing 'M'.

The four control codes shown below each line of text show the printer control codes at the start of the line. Embedded control codes show how the printing control changes, and where, along a line of text or graphics. If the text is to appear underlined or reverse on the printer it will be reversed out on the screen.

The screen switches between graphics modes and text mode as required by the text. should you want to check text yourself then you can change mode by pressing Commodore and shift at the same time.

Add or Delete

(11000 - 12160)

It is possible to add lines or delete lines in the middle of an existing document. Pressing 'A' while in the main menu willl bring you to this mode.

Should you enter this section of the program by mistake, pressing 'M', adding 0 lines or adding too many lines will all'return you to the menu.

You can add lines in either text or graphics mode. When you insert a line the line will be empty, enter the edit or copy modes to add text in its space.

You can delete any number of lines from the document. Lines are erased and existing lines are closed up to make the document smaller.

Copying Lines

(13000 - 13290)

This function allows you to copy lines from one part of the document to another. If lines are copies beyond the length of the document, any unused lines between the original document are added as empty text lines with normal spacing.

Merging Documents

(14000 - 14290)

Entry to this section of the program allows you to insert a document that is filed on disk onto the end of the document that is in memory.

The width of the existing document will be increased if the file being merged is wider than the one in memory.

That's all there is to it! The breakdown of the program should enable you to alter the program should you need it. You should soon be producing extremely neat, well laid out documents.

See listing on page 79

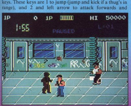
Games Reviews

A look at what's new on the games front.

RENEGADE

The streets aren't safe but you must cross town to collect your girl. You take the subway without any trouble, so far, so good, but when you get off the train you're met by a gang of thugs and one is wielding a crowbar.

You move around the screen using standard joystick controls and deliver your blow by pressing one of the attack keys. These keys are 1 to jump (jump and kick if a thug's in range), and 2 and left arrow to attack forwards and backwards. You press the key and the C64 decides whether you're punching or kicking.



Unfortunately, these keys are at the top of the keyboard and therefore nowhere near your joystick so you're either going to have to practice a lot, buy a joystick that you can stick to the table or enlist a friend to move you as you deliver the killing blows.

If you manage to survive the subway you then face peril on the pier as you battle with a gang of bikers who you must dislodge from their bikes before you can beat them into a pulp. Wipe them out and you have to face Big Bad Bertha and her whip-wielding female marauders, then a scrap in End Street with thugs armed with razors that will floor you with a single blow before a final battle inside to finish off this gang who also have a gun!

At each level you have to mash the band of minions before the boss appears. Bash the boss and progress to the next screen. Complete them all and you have a few moments before you start the whole game again, only this time the gangs are even madder.

Renegade adds a new lease of life for the tried and tested beat'em up game with variety of opponents and some good backdrops. T.H.

Touchline:

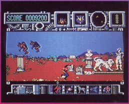
Title: *Renegade.* ***Supplier:*** *Imagine, 6 Central Street, Manchester M2 5NS.* ***Tel:*** *061-832 6633.* ***Machine:*** *C64.* ***Price:*** *£8.95 (Ca) £12.95 (Disk).*

Originality: *6/10.* ***Playability:*** *7/10.* ***Graphics:*** *7/10.* ***Value:*** *7/10.*

HYSTERIA

Wow, what a brill game – they were my first words when I saw Hysteria.

You are aware that someone or something is changing the past and shaping the future. Millions of light years away, three evil demons are playing with the fabric of time.



And being a real hard guy you decide to try and discover the demons and kill them. While you are waiting for them to show their ugly heads, you suddenly get caught up in a time warp and find youself in ancient Greece, surrounded by ruined temples. There are also busts (no – not Sam Fox) that spit at you, and if you shoot these, either a piece of puzzle or a lemon (!) will be revealed which can be picked up to select a weapon.

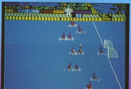
The weapons come in many forms. You start the game with lazer eyes, but it is quite a weak weapon. However, the next one is the more powerful lazer arrows which can be used to blow away nasties, and thirdly you have the protective dog, which isn't rally a dog but a white dot (I can see the resemblance) that hovers around killing any monster that strays into its path. For those tight spots a jet pack always comes in handy, and at a pricy four lemons this is good while it lasts.

Last but least there is the wonder weapon, and at a modest five lemons this little baby will bring a load of spinning death orbs all around you, killing all nasties.

This game is first class – neat sound, nice graphics and very playable. It's a shame that there are only three levels though, oh well you can't have it all. **K.R.**

Touchline:

Title: *Hysteria.* ***Supplier:*** *Software Projects, Bearbrand Complex, Allerton Road, Woolton, Liverpool L25 7SF.* ***Tel:*** *051-428 9393.* ***Price:*** *£8.99 (Ca) £12.99 (Disk).* ***Machine:*** *C64.* ***Graphics:*** *8/10.* ***Playability:*** *8/10.* ***Originality:*** *7/10.* ***Value:*** *9/10.*



WATER POLO

Congratulations, Gremlin Graphics, they've managed to find a sport that hasn't been done before! Now thanks to Gremlin's extensive research you can sample the excitement and end to end action as you take the plunge into Water Polo.

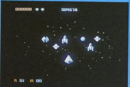
The six swimmers either side start at either end of the pool in a race for the ball. Whoever gets it can then swim with it or pass it hopefully to another player or try a shot or lob at goal. Naturally the other side (either human or computer controlled) try to get the ball off you by tackling you from the front as you swim with the ball or by intercepting one of your passes. If you try and tackle from behind, the poolside referee will get very excited and award a foul. Totals of these fouls are stored for each player and when one collects three fouls that player is sent off for about two minutes but returns before that if the opposition score a goal.

When you manage to score, the game shows you an action replay so you can either bask in glory or suffer a replay of an awful mistake.

The game is actually quite good and is full of end to end action and is ideal for those who want to perfect their tactics before they head for the swimming pools of Benidorm. **T.H.**

Touchline:

Title: *Water Polo.* ***Supplier:*** *Gremlin Graphics, Alpha House, 10 Carver Street, Sheffield S1 4FS.* ***Tel:*** *021-356 3377.* ***Machine:*** *C 64.* ***Price:*** *£9.99 (Ca) £14.99 (Disk).* ***Originality:*** *7/10.* ***Playability:*** *7/10.* ***Graphics:*** *5/10.* ***Value:*** *6/10.*



MEGA APOCALYPSE

Well, on the tail of that groovy game Crazy Comets is the follow up in the shape of Mega Apocalypse. But is it as groovy? Yes, it's acid stuff, as you play the part of a space ace, equipped with a super-duper space craft.

Your mission is to boldly go where no man has been before, seek out new and exciting worlds and then blow them to bits. That sounds fair to me as most of the inhabitants are stupid creatures such as welks.

The welks do not make easy prey however, and the planets they occupy have a will of their own and attack you with surprising force.

In between blasting planets you discover debris that turns out to be quite useful, as you can acquire goodies such as speed-up and rotate missiles and shields.

Mega Apocalypse also hosts a two-player option; you can play as friends or enemies, blasting each other, as well as the hostile planets, racing to collect the goodies. I discovered a good technique to get hold of the extras, was a shift kick to your opponents head – ask my brother!

Well, plenty of blasting, dodging and collecting, but is it worth the asking price? Hmmmmmmm, it's good, but I feel it could soon become boring doing the same thing all the time.

And those of you who already have Crazy Comets, will see the similarities in Mega Apocalypse, except of course for the superb speech and improved graphics. **K.R.**

Touchline:

Title: *Mega Apocalypse.* ***Supplier:*** *Martech, Martech House, Bay Terrace, Pevensey Bay, East Sussex, BN24 6EE.* ***Price:*** *£8.95 (Ca) £12.95 (Disk).* ***Tel:*** *0323 766616.* ***Machine:*** *C64.* ***Graphics:*** *8/10.* ***Originality:*** *5/10.* ***Playability:*** *7/10.* ***Value:*** *5/10.*

RED L.E.D.

When obscure planets were mined, huge quantities of rare materials were discovered, rendering minerals such as gold and diamonds valueless. Instead, marble became the most prized substance as it was only found on the trickiest of surfaces.

This in turn became worthless as all trade was abolished. Instead, the huge mining complexes were developed into places of entertainment.

Despite the usual inane storyline, Red L.E.D. is an excellent game. Very obviously derived from Spindizzy via Marble Madness, the object is to complete a path across a grid. You have three droids of differing abilities and must select both the droid and the sector you wish to enter.

Each sector consists of a huge scrolling terrain of walls, drops, acid lakes and the like. Four pods must be collected within a time limit in order to activate the exit. Enemy droids patrol the area and collisions with these or falling off the superstructure results in time penalties. Droid generators can be blasted, but then the rest of the droids turn particularly nasty and come gunning for you.

One of the droids can float harmlessly over the acid lakes. Others have to activate special switches in order to temporarily freeze them. Other areas can only be accessed via teleports. You can improve your time allowance by walking into a time-distort capsule – but make sure that it is spinning the right way.

Controlling your droid takes some getting used to due to the built-in inertial system. One of your droids handles gravity much better than the others so it obviously makes sense to use him on the extra hilly sections. There is a bonus game to access and extra men, should you do particularly well.

Not only does this game look extremely impressive, but the gameplay matches the graphics and the result is infinitely more playable than either of its ancestors. Very highly recommended. **G.R.H**

Touchline:

Title: *Red L.E.D.* ***Supplier:*** *Starlight, 68 Long Acre, Covent Garden, London, WC2E 9JH.* ***Tel:*** *01-836 3411.* ***Machine:*** *C64.* ***Price:*** *£9.99 (Ca) £12.99 (Disk).*
Originality: *7/10.* ***Graphics:*** *9/10.* ***Playability:*** *9/10.* ***Value:*** *9/10.*

RAPID FIRE

The latest game from Mastertronic is a little on the gory side. You play a Rambo-type character on a mission to raid a top security warehouse. Getting into the warehouse is no hard task but progressing to the fifth level sure is.

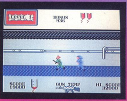
The levels are guarded by all kinds of various baddies such as armed henchmen, flying grenades and balls of fire; all of which have to be dodged or shot. To progress onto the next level you will have to shoot a huge computer terminal where it hurts – in its revolving red sphere (whatever that is!). If you are successful, a hole in the floor will open and you will fall through to the next level.

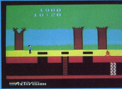
If by a freak or pure luck you manage to get to the fifth level you will have to confront a master computer (no, not an Amiga) and if you can destroy this you have won the game.

This game has no stunning storyline, no groovy Rob Jubbard music and the graphics are pretty average – another duff game? Not on your nellie mate. It is really addictive and quite frustrating and for a humble two quid you can't go wrong. Buy this game or your arms will fall off – need I say more?

Touchline:

Title: *Rapid Fire.* ***Supplier:*** *Mastertronic, 8-10 Paul Street, London EC2A 4JH.* ***Tel:*** *01-377 6880.* ***Price:*** *£1.99.* ***Machine:*** *C64.*
Graphics: *5/10.* ***Originality:*** *7/10.* ***Playability:*** *8/10.* ***Value:*** *9/10.*





PITFALL 1 & 2

Remember the good old days, when the VCS's from Atari were all the rage? You do? Good, then you will also remember those fab games in Pitfall 1 & 2. Well, Firebird have now bought the rights and re-released them.

In both of the games, you play the part of Harry, the intrepid hero who is in search of lost and valuable treasure. In Pitfall I you find yourself in a jungle full of traps, where there are gold bars lying around which you find hard to resist (understandably!). The gold however is not easy to get at as it is guarded by crocs with snapping jaws that need to be jumped over, huge holes that open and close, and voids that have to be swung across by a vine which requires perfect timing.

At the beginning of the game you are given 2000 points and these will decrease everytime you fall down a hole or the like. Scorpians are also a hinderance as these home in on you and are quite hard to avoid. Pitfall 1 is quite a playable game, but it is basic. Another point, this game was converted from a 16K machine, "so what" I hear you say. Well, it has been copied almost exactly, the Commodore has 64K, wouldn't it have been better if they looked to improve it?

There I rest my case; if you haven't got it have a little look at it, you might like it.

Next comes the sequel in Pitfall 2. This is quite a good game going by its age.

Again you play Harry the explorer, but this time it's not just the gold you're after, it's your friends, who have got themselves lost in a huge underground labyrinth, you must also seek out the legendary cave rat and capture him. This will also boost up your money.

When you start off, you are in what looks like a jungle (Pitfall I) but as you make your way across the screen you will discover potholes which have to be jumped down to reach the underground river which is unfortunately inhabited by electric eels.

An annoying feature of this game is the lack of a death system, which seems to be replaced by a number of red crosses scattered about the playing area, and if touched by any creature you will be transported back to the last cross you touched. Sometimes this can take quite a while and is always frustrating.

The music in the game is not bad. The graphics are nothing special but I highly recommend this game if you do not have either of them. In their era these games were wonderful, but now at £1.99 they still represent good value.

K.R.

Touchline:

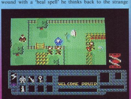
Title: *Pitfall 1 & 2.* ***Supplier:*** *Firebird, First Floor, 64-67 New Oxford Street, London, WC1A 1PS.* ***Tel:*** *01-379 6755.* ***Price:*** *£1.99 each.* ***Machine:*** *C64.*
Title: *Pitfall 1*
Graphics: *5/10.* ***Originality:*** *8/10.* ***Playability:*** *6/10.* ***Value:*** *7/10.*
Title: *Pifall 2*
Graphics: *7/10.* ***Originality:*** *6/10.* ***Playability:*** *8/10.* ***Value:*** *8/10.*

DRUID II

It's been 103 years since Hasrinaxx the Druid wiped out the evil being Acamantors, but somehow he has returned.

It was a cool summer's day in the forest of Argoth, the sun shone brightly as a warm breeze filtered through the trees, rustling their leaves. Hasrinaxx walked down the beaten path looking for some mistletoe which he needed for a new spell – Zapper.

As he walked along, squinting to keep the blazing sun out of his ageing eyes he noticed a bush in full bloom ahead. Suddenly, from out of the blue, came a wild boar with a look of terror on his face. Before the old Druid could react the boar was upon him and attacking his leg. Hasrinaxx swiftly pointed a finger at the creature, chanted two mystic words and an electric bolt hit the boar between the eyes, and the boar funs off screaming with pain. As the Druid tends his wound with a 'heal spell' he thinks back to the strange occurence that has just taken place, and wonders "what could have gotten that boar in such a state?"



He paused for a while – he could sense men in the woods, but there was something else, something weird.

A huge clap of thunder broke the unearthly silence, and the sky grew dark. Hasrinaxx's senses were tingling – he could smell something disgusting, the smell of … death. From out of the bushes came scores of humans, dead humans – the living dead. One single thought entered the Druid's head, "Acamartors." He searched franticly in the canvas bag that held all his belongings and pulled out a silver cross, holding it high and causing the zombies to back off into the trees and bushes. Hasrinaxx then begins his long walk back to the village…

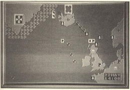
Well, that's roughly the story line for Druid II and now we move onto the game.

You start off in the village and come under constant attack from zombies and skeletons. You will also find various spells lying around which can be picked up and used. There are 32 spells and four elementary servants, which is a lot more than Druid I. The graphics have been improved and the game is much more playable than the first.

So there you have it, if you liked Druid and want some more of the same, get Druid II, you will not be sorry.

. K.R.

Touchline:
Title: *Druid II.* ***Supplier:*** *Firebird Software, First Floor, 64-67 New Oxford Street, London WC1A 1PS.* ***Tel:*** *01-379 6755.* ***Machine:*** *C64.* ***Price:*** *£9.99.*
Graphics: *8/10.* ***Playability:*** *8/10.* ***Originality:*** *5/10.* ***Value:*** *9/10.*



BISMARCK

In May 1941 the entire British home fleet (reinforced by ships urgently needed to protect convoys) were involved in an amazing search and kill operation designed to find and sink the Bismarck!

The Bismarck was the biggest battle ship the world had seen and was ready to hunt and kill in the shipping lanes. It was to be paired with the Cruiser, Prince Eugen and fight off the British warships while the Prince Eugen destroyed the convoys.

The Admirality sent out the order, "sink the Bismarck!".

You can play either the British or German commander in this deadly game of hide and seek. The German player starts North of Iceland and must escape, relatively undamaged, off the bottom of the screen and into the open seas. The British player must stop him.

Both players can get regular weather forecasts, intelligence reports and can fly reconnaissance missions (if the weather isn't too bad) that will help them find the enemy and attack or avoid. The British player controls six of 12 ships (the others are controlled by the Admirality) the German only has two (the Bismarck and the Prince Eugen). It's going to be a close fight.

Whenever ships meet they can engage in battle which is fought in an arcade sequence in which you must select icons to control the ships speed to close, retreat or maintain the same distance between you and the enemy, fire and aim your guns and man the damage control systems to put out any fires.

Some British ships also have torpedo tubes and the Aircraft carrier Victorious can attack with Swordfish aircraft.

The British player cannot hope to sink the Bismarck in one fight and so must use its lesser ships to inflict as much damage as possible so the Battleships have a chance to sink it.

Bismarck is an excellent game based on one of the most decisive battles of the war. If the Bismarck had escaped...

T.H.

Touchline:
Title: *Bismarck.* ***Supplier:*** *PSS, 452 Stoney Stanton Road, Coventry CV6 5DG.* ***Tel:*** *0203 667556.* ***Machine:*** *C64.* ***Price:*** *£9.95 (Ca) £14.95 (Disk).*
Originality: *8/10.* ***Playability:*** *8/10.* ***Graphics:*** *7/10.* ***Value:*** *8/10.*

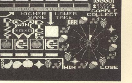
DIZZY DICE

Now here's something original – a fruit machine game! I thought they had died out with the ark. Although after playing this, it might have been better if they had.

To be sure, the game itself is very slick and looks good on screen even if you are not sure what is happening. There are four reels, and winning combinations pay out when they read either from left to right or vice versa. Reels can be held when the appropriate lights flash.

Should you manage to light a sequence of six fruits, you get to take part in a dice game, in which you must guess whether the next roll is going to be higher, lower or the same as the previous one. Getting into the dice game requires you to lose an awful lot of games on the trot as a winning combination, e.g. one cherry resets the fruit sequence.

When you get a winning combination, you can gamble your non-existant money although my strong recommendation is to not bother – the odds you get are

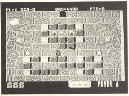


terrible. You must select the symbol a spinner is going to stop at. If you choose the bar, the odds against it coming up are fifteen to one against. The machine pays you six to one.

Computer fruit machine games fall into the same category as decaffeinated coffee or alcohol free beer. Why bother? The whole idea behind gambling is the risk that you might lose, coupled with the possibility of a big win. Playing with non-existant money defeats the whole object of the exercise. **G.R.H.**

Touchline:

Title: *Dizzy Dice.* ***Supplier:*** *Players. 2 Mineguae House. Calleva Park. Aldermaston. Berks RG7 4QW.* ***Tel:*** *(07356) 77288.* ***Price:*** *£1.99.*
Originality: *3/10.* ***Graphics:*** *7/10.* ***Playability:*** *2/10.* ***Value:*** *2/10.*



SOLOMON'S KEY

*W*ho needs parallax scrollings, ultra-fast 3D solid graphics and super-bouncy, mega groovy music to make a decent game? Well, most people seem to, except U.S. Gold who have converted a highly playable game which a few of you may remember. It goes by the name of Solomon's Key, which was fab in the arcades.

The story line is concise. You play a treasure seeker (aren't we all?) and on entering Solomon's mines. You must search through the levels avoiding all the deadly perils. Your main goal is to reach the key on each level and make haste towards the door. Each door you go through will bring you closer to your ultimate goal – Solomon's treasure room.

At the end of the third level you go into a bonus room, where you are instructed to cast a spell on the key. However, it is unclear what this actually means and the instructions give away no clues, I'm afraid.

The screens are littered with objects, but there are too many to mention them all. The main ones are flames which can be used to fry the little monsters that wander around the screen. Your other option is to pull a block away from under the monster's feet and watch him fall to his death (yeah!).

There are also alot of little bells around, which when touched, summon a fairy which you can eat for dinner. Eat ten of these and you will get an extra man, plus indigestion.

Your only real help is a magic wand, which for some strange reason makes mud bricks appear and disappear. These are necessary to build stepping stones to the exit or to trap monsters (similar to the game Pengo, except you don't push the blocks).

I have been playing this game for hours (that's interesting to hear: ED) and I'l take it home tonight and play it for hours (you've got work to do: ED).

Well, what can I say, buy this game or it'll be a case of spontaneous combustion? Maybe. **K.R.**

Touchline:

Title: *Solomon's Key.* ***Suppliers:*** *U.S. Gold. Units 2/3 Holford Way. Holford. Birmingham. B6 7AX.* ***Tel:*** *021-356 3388.* ***Price:*** *£9.99.* ***Machine:*** *C64.*
Originality: *5/5.* ***Graphics:*** *7/10.* ***Playability:*** *8/10.* ***Value:*** *9/10.*

ON FIELD FOOTBALL

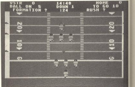
*O*n Field Football is the latest Activision game to be re-released as a Firebird budget game. Written by Gamestar, On Field Football attempts to capture the essence of Super Bowl excitement and fails.

Four-aside football played between two teams of pyjama clad players captures the essence of a poor game. The instructions are brief to a point, of not telling you everything you need to know and only presents an almost meaningless table of plays, formations and the joystick movements required to select them.

If you manage to decipher the table you find an extremely limited selection of offensive and defensive players and with only four players you barely have the manpower to execute them. The quarterback not only passes the ball, he also doubles as the runningback and the shooter!

The game also features a computer opponent that will pummel you into the ground and leave you wondering why you spent £1.99 on a game like this. **T.H.**

Touchine:
Title: *On Field Football.* ***Supplier:*** *Firebird, First Floor, 64-67 New Oxford Street, London WC1A 1PS.* ***Tel:*** *01-379 6755.*
Machine: *C64.* ***Price:*** *£1.99.*
Originality: *4/10.* ***Playability:*** *3/10.* ***Graphics:*** *4/10.* ***Value:*** *3/10.*



Easy Count

A word counter for Easy Script users.

By M. P. Leach

Easy Script is probably the most common wordprocessor in use on the C64. One of the main problems with the program is that it willl not allow the user to perform a count of the number of words that are in a document. If you need an accurate count then the only way is to count the words by hand. Until now that is.

Easy Count is a program that will count the numbers of words that are in any Easy Script file.

The program looks for a non-space character, then searches for the next space once the counter is increased.

If a format or printer command is found (i.e. F1 or F3) the count is halted until a semi-colon is reached or a carriage return is found. This does mean that all format or printer commands which are not followed by a semi-colon must be on a separate line. The enhancement commands (see pages 8,9 of the manual) must not have a space between them and the following text, or they will be counted as single letter words.

Getting it in

The program is presented here as a Basic Loader and should be typed in using the Syntax Checker program found on the LISTINGS page.

When RUN the program will automatically execute the machine code.

Follow the on screen prompts to use the program. The directory of the disk in the drive may be read from inside the program. For those technically minded the program resides in memory from $C000 to $C3EC and is executed with SYS 49287.

YC

See listing on page 84

Communications Corner

Keep up to date with what's on in the communications world with David Janda.

As I write, the PCW show is coming to an end. There was nothing new, comms wise for the C64/128, but there were several new developments with regards to on-line services. Both Compunet and Micronet were at the show attracting new customers and showing off their latest features, and in all it was an interesting show for the comms enthusiast. Let's have a look at what was on offer.

Gateway Developments

Micronet is developing new gateways to and from its database. In simple terms, a gateway is an electronic link between one computer and another. Shades, Micronet's Multi-User Game (MUG) is an example of a gateway, and Micronet's announcement of a scrolling gateway is a development from this.

The scrolling gateway enables users with dumb terminal software to use scrolling types of services via Micronet. Going back to Shades, the output from this game is converted into the viewdata format in order to be displayed on the screen. The new scrolling gateways simply remove the conversion process and leave the output as text on a plain background with no fancy graphics or colour.

Technologically speaking this is no big deal, and begs the question, why have scrolling text when you can have viewdata?

Well, some applications such as using Telecom Gold via the Interlink gateway are best suited for scrolling type displays. Micronet are developing a scrolling gateway for Interlink users, but this shall not be ready before Christmas.

The first scrolling gateway should already be in operation and is for Shades players. Users will be given the option to play Shades in the standard format, or with scrolling software. Apparently, there is a speed advantage to playing MUGs with scrolling software.

Andy Waller, who runs the excellent Soley Sixty Four (*SSF£) area on Micronet has developed a stand-alone scrolling package for C64/128 users that can be downloaded from his area free of charge. This will be compatible with the Commodore modem, OEL comms pack, multi-modem and Mustang software, and will display blue text on a white background. The idea is that you use it to log onto Micronet and go to the area where the scrolling gateway is. The software will automatically detect when the gateway is being entered and will display 40 columns by 24 lines.

Let's Chat

Micronet are also working on a conferencing system. The idea being that you go to a particular area (called a centre), meet in the reception area or bar, pick up a key, go to a room and have control over who can and cannot enter. You can even pull down a shade thus preventing anyone from knowing who is in your room. Of course there will be commands such as lock, close, etc to enable you to do all this.

Teleconferencing is not a new idea. British Telecom operate such a service whereby several people can have their phones 'linked'. American databases such as the Source and CompuServe have them as well. It is important for Micronet to ensure easy use of the conferencing system, with simple, clear commands to operate it. The idea of a conferencing system is for a group of people to meet and discuss, and not get bogged down in the technology of the system itself.

I understand that the system will also have the option of being accessed by a scrolling gateway.

Both the Shades scrolling gateway

and the conferencing system will be chargeable services, but these have not been fixed yet.

Commodore Modem RIP

Compunet have a problem – they have no modems! The Commodore modem is no longer in production and Compunet Teleservices have run out of stock. Currently they are looking for an alternative modem for C64/128 users, and it's my belief that they or Ariadne Software (who wrote the original Compunet Terminal software for the Commodore modem) will develop a software patch to be used in conjunction with the Miracle multi-modem and Mustang software packages. Compunet hope to have an alternative by Christmas.

New Look Compunet

Compunet is now running on its own mainframe which reaps the benefits of a system which is much faster in operation (although not as fast as Prestel/Micronet). The system is having a bad case of teething trouble but this should be sorted out in time – there is still a long delay when initially signing on, and more often than not I have suffered the 'Sorry, all links to Compunet full' message. This is no fun expecially when it costs 4.4p plus VAT for the phone call only to be greeted with that message!

Compunets MUD and FEDERATION MUGs are not operational either, but all should be in order by Christmas time.

Do not despair – not all is doom and gloom. The speed increase has to be believed, and when I tried out the system there were very few of the C, N and S type errors that were common on the old system, Partyline is now so fast that the special scrolling software is being given away as a free link. This is because the text scrolls by so fast that you need the buffering in the software to look back at what has just whizzed by!

A new development from Compunet is that by Christmas time (a popular date it seems!) both the Amiga and ST will be supported Concentrating on the Amiga: the software to access Compunet will cost £19.95. It makes full use of Intuition, with a windowed mouse operated display, pull-down menus and point and click gadgets for commonly used functions.

Finally, the pricing structure for Compunet has now been greatly simplified. There is the standard subscription which costs £12 per quarter, and gives you limited access and not as many privileges as the Gold subscription, which costs £15 per quarter. In addition, for an extra £3 per quarter you can get unlimited off-peak access without the additional network change. Obviously, the Gold plus unlimited off-peak package is going to be attractive for those who would like to use the system on a regular basis. However, for those who would like to test the water a Standard subscription is ideal, and you can upgrade to Gold and request unlimited access online.

Well, that's it for this month – I'll be back soon with some more communications chit-chat.

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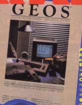
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Budget Calc

Keep track of your money with this budget program.

By Simon Phillips

Budget calc is a budget utility based around two spreadsheets. The first contains the actual monthly figures, the second contains the estimated figures.

Budget Calc is split into several sections, the main program, review program, end program, changing subjects and changing months. The first three RUN automatically, and interact with each other. The last two programs have to be LOADed separately.

Changing subjects and months

Budget Calc has the capacity for 16 subjects, and these can be changed to suit the user. The subjects are stored in a sequential file on disk, the same for the month order. Each of the subjects must be no more than 12 characters in length.

For different people, financial years change. With *Budget Calc*, you can have your financial year from Jan to Dec.

When LOADing and RUNning *Budget Calc*, you will be asked for the present month, this is for the printout, file purpose, and the advance year facility. The program compares the month with the start of the financial year, and if they match, then the year is updated. Once the space bar is pressed, data is loaded. This is in three separate sequential files. The first data is the actual and estimated figures, along with back−dated figures, in the 'budget data' file. The second data is the subjects, LOADed from a file called 'budget subjects'. The last is the month sequence.

Once the red light on the disk drive goes off, a command window is printed at the bottom of the screen, and the spreadsheet window is displayed in the upper and middle of the screen. The window is moved around the spreadsheet by using a joystick in port(No.)2. Pressing the fire−button and moving the joystick left or right will cause the large cursor to move through the five commands. The cursor has a wrap−round feature, and the inverse command denotes which mode you are in. Pressing the fire−button will execute these commands. They are:

REVIEW, MOVE, AMEND, END, ACTUAL/ESTIMATED

REVIEW
Further LOADing is required for this function and this is done automatically. Once LOADed, a menu screen is printed and five options are given:

Review months;
Review subjects;
Review totals graphically;
Review profit and loss;
Return to the main program.

The first two options allow the user to review figures back−dated by three years. Once these options are executed, only half of the months or subjects are displayed. By moving the joystick up and down, access can be gained to the rest of the figures. Pressing the fire button will display the menu once again. Review Totals displays graphs of the past and present annual totals. There are two subroutines for this option. The first is for totals not exceeding 4000, and the second is for totals greater than 4000.

Pressing the fire button will return you to the menu.

Review profit displays the spreadsheet as a grid. After a couple of seconds boxes will be coloured either red or green. A red box means that at that position on the spreadsheet the actual figure is greater than the estimated one, and so is classed as a loss. A green box means a profit and that the actual figure is lower than the estimated. No doubt there will be a lot of red boxes at the end of the grid because there are as yet, no actual figures. Pressing the space bar will return you to the menu.

MOVE
This command enables you to move around the spreadsheet.

AMEND
This command is used in conjunction with the 'move' command. It is used to change, add and correct figures. Use the move command to position the entry place on the screen. Enter the amend routine and press fire. Three reverse characters will be displayed in the top left hand corner of the first figure. This is now your cursor and you can move it around the four by four square of figures. Simply type in the new figure (only using three characters) and then press RETURN. If you have made a mistake in keying in the new value and you have not yet pressed RETURN, then type out the figure again and it will be printed over the mistake. If you have made a mistake and have pressed RETURN, then you will have to go through the routine again. If at any time you want to get out of the amend routine then press the fire−button and you will return to the move command.

END
After selecting this command, the 'bud end' program will be LOADed and RUN. The program does not need any explanation of how to use it. It allows the saving of data, and the process of making hard copies. Data will only be saved if:−(a) figures have been altered or added, (b) the advance year facility has been executed.

Printing is straight forward, and if you have not switched the printer on, the program will tell you to switch it on. you can return to the main program or end which will result in a cold start of the computer.

ACTUAL
This displays the spreadsheet you are viewing. There are two spreadsheets, as explained. The word 'estimate' replaces 'actual' when the estimated spreadsheet is displayed, and visa–versa. This is displayed everytime you use the spreadsheet, so as not to get confused when amending figures. All of the above commands are available in estimated and actual mode.

Getting Started

When starting off with *Budget Calc* only the listings presented here will be on disk. The data files have to be created before any of the program will function. Thee small programs *BUD DATA CREATE, BUD SUB CREATE,BUD MON CREATE* are those that I actually used when wanting to make the individual files.

BUD DATA CREATE

This file will create sequential data for BUDGET DATA on disk. This is the longest file that has to be made.

The variables have the following meaning:
SR year advance status
CM present year – 3
Y$(a) dim of estimated figures
H$(a) dim of estimated figures
SR,SS,SU are strings which contain last three years monthly totals.
BA,BB,BC are strongs which contain the last three years subject totals
GT(1), GT(2), GT(3) contain the last three years actual totals

BUD SUB CREATE

This file will create the data for BUDGET
CH$(a) is a DIM containing an unpadded string
NB and NC contain the number of spaces needed to pad the start and end of the string.

BUD MON CREATE

This will place the data for the file BUDGET MONTHS on disk.

The variables M$(1) to M$(12) simply contains the month names.

NOTE The above are only needed when creating the files for the first time.

BUDGET CALC PROGRAM DESCRIPTION

LINE	DESCRIPTION
100–420	Printing of screen and input of present month.
430–480	Dimensioning variables and strings.
490–500	Loading actual and estimated figures.
510–580	Loading past figures and totals.
590–640	Loading subjects.
650–690	Conversion of zero figures into –––.
700–710	Conversion of figures to spreadsheet variables.
720–730	Loading month sequence.
740–990	Setting variables and strings.
1000–1380	Printing of the spreadsheet.
1390–1630	Boundary limitations.
1640–2090	Amend routine.
2010–2550	Movement of command cursor.
2560–2910	Subroutine for calculating subtotals for actual figures.
2920–3190	Subroutine for calculating subtotals for estimated figures.
3200–3460	Advance year routine.
3470–3490	Loading of other programs.
3500–3640	Conversion of variables to the spreadsheet.
3650–3930	Saving of important variables to be loaded again.

BUD REVIEW

LINE	DESCRIPTION
100–370	Loading of important variables.
380–550	Converting actual figures to past figures.
560–780	Menu.
790–980	Review subjects (1).
990–1180	Review subjects (2).
1190–1350	Review months (1).
1360–1510	Review months (2).
1520–2150	Graph 1 (0–4000).
2160–2800	Graph 2 (0–9999).
2810–3260	Profit and loss screen.

BUD END PROGRAM DESCRIPTION

LINE	DESCRIPTION
100–350	Loading of important variables.
360–380	String defining.
390–750	Save.
760–960	Menu.
970–1040	Test to see if printer is on.
1050–1170	Inform user that printer is not on and systems reset.
1180–1200	Branching of different hard copies.
1210–1430	Actual figures hard copy.
1440–1650	Estimated figures hard copy.
1660–1920	Actual and estimated figures hard copy.

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Packed in 25's, complete with envelopes, labels, WP tabs and hub-rings. Disks individually certified and tested (on both sides) to 96tpi means no problems and higher reliability. Lifetime Warranty.

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Across the Board

More and more companies are producing adventures based on well-loved board games – watch this space for the latest releases.

By Tony Hetherington

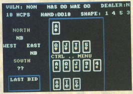
What have Trivial Pursuit, 221B Baker Street, Ogre and Autoduel in common? The answer is that along with Chess, Bridge, Monopoly, Scrabble and Cluedo they are part of a growing band of baord games that you can now play on and with your C64.

Intellectual Classics

Classic games such as chess and bridge have always been computer favourites and have now reached the standard where they can usually beat their human players. Most software houses have entered a contestant into the classic games stakes that has now replaced the urge to produce fruit machine or Othello games.

The main players in the chess stakes include Mastertronic's Masterchess, with the cheapest (at £1.99), Audiogenic with Grandmaster (that includes a free Othello game) and CDS's Colossus Chess 4. All three will give you a good game and include features to allow you to tailor the game to your level and alter screen colours, provide you with move hints and allow you to backspace if things didn't go according to plan.

Colossus Chess 4 also includes options to display a 3D board, replay the game so far, and six different types of game from full-timed tournament mode to problem mode where the program will help you solve magazine chess problems.


VULN: NON N&S 00 W&E 00 DEALER:N
18 HCPS HAND:0018 SHAPE: 1 4 5 3
NORTH
NB
WEST
EAST
NB
SOUTH
??
LAST BID
CTRL .. MENU

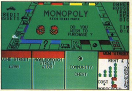
Colossus Bridge 4

Bridge as a game doesn't seem to convert to computer logic as well as chess, probably because at least half of the game is in the understanding with your party and the rest is a combination of luck, card skill, bluffing and a good bidding system. Unfortunately, the trio of Colossus Bridge 4 (CDS), Classic Bridge (Anco) and Oxford Bridge (Thinking Games) cannot hope to simulate this and ends up being a poor substitute for Bridge addicts, abandoned without three other players.

There can be some help for beginners who want to learn the game without the embarrasment of the long post-mortems that Bridge players seem to relish and will find good value in Colossus Bridge 4 as the pack also contains a copy of Begin Bridge by G. Fox that will teach you more than the limited tutorial.

Old Favourites

The Waddington games, Monopoly and Cluedo are quickly attaining classic status with the world famous property game celebrating its 50th birthday last year. Both are now available in a triple pack from Leisure Genius (along with Scrabble) and will provide computer opponents the 360 days of the years when the family don't want to join in. Leisure Genius has just updated C64 Scrabble and has recently launched Scrabble deluxe which features a vocabulary of 20,000 words and eight different skill levels. A full review of Deluxe Scrabble is included in this month's IQ.

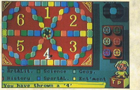


Monopoly

The Latest Craze

Last year, Trivial Pursuit stormed the shops around Christmas time and found its way onto coffee tables throughout the world. Thanks to Domark it has also appeared on the C64 and has now been followed by a young players version and the Baby Boomer collection for all those born in the 60s. Since then there have been other trivia games including Datasoft's Mind Pursuit in which you have to answer questions to get across a game track and Arcana's Powerplay where correct answers gave your pieces the power to fight in the arena.

SSI's Colonial Conquest is obviously inspired by Risk and gives you the chance to quench your thirst for global domination. Against other human or computer controlled opponents that play the major powers of the world, you muster and send out your armies and fleets to conquer new territories. This new land will give you more resources to build more armies, or bribe or undermine neutral regimes, pay off unwanted enemies or get spy reports on opponent army strengths.



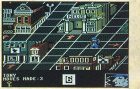
Trivial Pursuit

Sherlock Holmes I Presume?

221B Baker Street (Datasoft) casts you in the role of the world's most famous detective as you compete against up to three other players (Doctor Watson, Inspector Lestrade or Irene Adler) to solve one of thirty different cases that include the curious cases of the "empty handed thief", "the amourous sailor" and "the perculiar charwoman".

Once the characters and case have been selected then each player should read the case notes in the enclosed booklet so that they know what they're looking for before the game begins. From then on the play continues as each player in turn, throws a dice, and then moves around the board that represents the town. Whenever you enter a building you will receive a clue or part of a clue that can be coded so that only you can understand it.

Armed with these clues and badges you can lock buildings to keep the other detectives out, the race is on to solve the case. Thirty different cases should keep digital detectives sleuthing for some time.



221B Baker Street

Shoot!

Brian Clough's Football Fortunes is a computer game that's also a board game! Inside the packed box alongside the game tape or disk you'll find a board, counters and over 100 playing cards. These cards represent the individual players that you must buy and sell to form the right combination of defence, midfield and attack to win league and cup honours.

However the best laid plans of mice and football managers are often disrupted by chance that come in the form of 'computerised chance' or 'managers luck' and 'selection' problem cards in which you can gain and lose money and players. The fun really starts when a star striker comes up for auction just before a big game.

Autoduel is a role-playing game (available through Microprose) in which you must "drive offensively to save your own life". It is based on the incredible Steve Jackson game of Car Wars. In the computer version you must build a custom car, pile on armour plating to protect it then arm it with lasers, machine guns and flamethrowers before you dare take to the open road.

Unfortunately, you need money to buy the weapons and since you begin the game desperately short of cash, your only chance is to risk life and limb by entering Amateur Night in the Arena. Survive that and you may win enough money to build a car. Later on in the game you'll be able to gamble in casinos, truck across futuristic America, carry special deliveries or just go on the open road on a vigilante trip.

Soon Available

A second game from the excellent Steve Jackson Microgames series is coming soon from Origin and is a computer version of Ogre. This will be a wargame in which one side has an army of hovercrafts, tanks, howitzers and infantry lined up against a single unit. Unfortunately, that unit is an Ogre. A massive Cybertank that bristles with missiles and guns. It's going to be a close fight.

There's more board game conversions to come as Domark plan several more Trivial Pursuit question packs. Activision is set to release its version in September and Gremlin Graphics has announced that they're computerising the Games Compendium in a "new and wacky form" that includes snakes and ladders but with real snakes, and Leisure Genius (Virgin) has plans to extend its range of games with Scruples and Diplomacy! If you haven't played Diplomacy before you're in for a surprise! Seven human or computer controlled players lieing, cheating, bribing, dealing and fighting for control of Europe!

Touchlines:

Mastertronic: *8-10 Paul Street, London EC2A 4JH.* ***Tel:*** *01-377 6880.*

Audiogenic: *39 Suttons Industrial Park, London Road, Reading RG1 6AZ.* ***Tel:*** *0734 303663.*

CDS: *CDS House, Beckett Road, Doncaster DN2 4AD.* ***Tel:*** *0302 21134.*

Anco: *35 West Hill, Dartford, Kent DA1 2EL.* ***Tel:*** *0322 92513/8.*

Leisure Genius/Virgin: *2-4 Vernon Yard, Portobello Road, London W11 2DX.* ***Tel:*** *01-727 8070.*

Microprose: *2 Market Place, Tetbury, Gloucestershire, GL8 8DA.* ***Tel:*** *0666 54326.*

SSI/US Gold: *Units 2/3 Holford Way, Holford, Birmingham B6 7AX.* ***Tel:*** *021-356 3388.* YC

Sprite Library

Kicking off our Sprite Library series, we look at the full potential of the sprite.

By Mike Benn

Sprites are undoubtedly one of the most useful graphic aids available to the programmer. They have the ability, on command to move freely around the screen, change colour and shape and to create realistic animation which enables them to become an essential element of good graphic design. They can be easily accessed from Basic even if they do need a few POKEs to get them working.

The 'User Manual' that comes with the computer describes, through instructions and examples how to put sprites on the screen, move them about and manipulate their parameters in a number of ways – but hardly taps their full potential of the sprite or the computer programmer.

Programmers of arcade games are well aware of the difficulties that have to be overcome because the system development of new games. Programmers of the C16 are only too well aware of the difficulties that have t be overcome because the system designers overlooked the need for sprites.

Flexible Sprites

Sprites are not just used in arcade games. Their flexibility makes them adaptable for use in all types of programming. Simulations, education based programs, business software and many utility programs often utilise their special characteristics. It is, however, the arcade game that puts sprites, to best use.

One of the most impressive uses of sprites is the creation of animated graphics. By running a series of similar, but slightly different pictures, the eye and brain are tricked into believing the sprite is alive. As with all forms of animation, the best results require many individual designs to produce a smooth and credible animation. The oustanding animation quality in 'Summer Game 1 & 2' is a fine example of the excellence that can be achieved.

Pre-planning Required

Creating and developing a new game requires considerable pre-planning to attain maximum impact in all areas, and good sprite designs are particularly important. Take for example, a simulation of an aircraft coming into land. If it touches down too hard or overshoots the runway, it could be that a sprite 'explosion' will add realism to the game.

Sprites must be designed to accommodate this or other eventualities even though only one of the designs is ever called upon at one time. The sprite registers include collision detectors which helps the programmer, and can be read by PEEKing them, to see if a sprite has collided with another sprite or hit something in the background. Breaking a game plan down into individual sections will help in the process of deciding which type of sprite designs will be the most effective.

Machine code programmers have the distinct advantage of speed, in programming 'shoot-'em-up' games, where as Basic is slower. In machine code you can put 64 sprites on the screen at the same time rather than just the eight, accessed by Basic. It's difficult to know what type of program would use so many sprites, but it can be done.

There is a half-way house that Basic programmers can use; SYS calls and Basic extensions. A SYS call is a machine code subroutine that can be called from Basic to handle a part of the program where speed is an advantage. Such subroutines are often published in *Your Commodore* and are well worth looking out for. Basic extension is a software program written to supplement the computer's own somewhat limited Basic commands.

Designing Sprites

Designing sprites can be very time consuming, even more so if you follow the technique used in the 'User Manual' which explains the theory of sprite creation and which requires large amounts of arithmetic to produce one sprite design. This seems a shame when you have a computer that can do this type of simple maths standing on its joystick.

A useful piece of software is a 'sprite editor' which allows you to concentrate on the design and leaves the computer to worry about the mathematics. A word of warning though – a sprite has no artistic skills of its own, and relies totally on the skills of the operator.

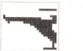
Sometimes, one sprite isn't large enough on its own to provide the design you want. This is overcome by placing two or more sprites next to each other in a suitable manner. The pre-designed aircraft that accompany this article use this capability, working side by side, but when run on the screen, appear as one. The sprites are stored in memory alternatively so we start of with Sprite I then Sprite II for the first design. The following designs stored in a similar manner so when the sprites are run in a program, the order is known. A Basic program that would animate four sprites as one larger design would be used as follows:

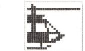
```
FOR SP = 0 TO 20
STEP4:POKE2040,SP:POKE2041 +1
:POKE2042,SP+2:POKE2043,SP +3:
NEXT
```

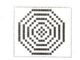
The STEP command steps every four sprites so that the first part of the design is always read by the first sprite pointer.

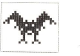
The complex animated sequences found in any good arcade game needs a great deal of artistic and creative skill to produce. To design a set of sprites from scratch can take days of work and can still fall short of the standards required. The answer to the problem maybe found in Sprite Library.

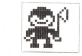
A wide selection of pre-designed sprites have been saved in Basic loader form to create the basis of an extensive 'Library', illustrating and animating everything from a porche to a square.











Forms of Flight

Let's start the series by taking to the air in three different forms of transport. Starting wth a small jet followed by a helicopter flight and finally a white knuckle ride under a hand glider. Both the plane and the helicopter approach the viewer from the distance and turn to the right. The hand glider is not fully animated as space did not permit. However, there should be enough key frames for you to fill in the missing animation. All the sprite definitions require two sprites.

Hex	Decimal	Description
A0-B7/	160-183	Jet plane approaching and turning to the right.
B8-CA/	184-202	Helicopter approaching and turning to the right.
C0-C3/	192-195	Helicopter blades turning while helicopter hovers facing the viewer.
CA-C0/	202-205	Helicopter blades turning while helicopter hovers facing right.
CE-D5/	206 - 213	Hand glider turning to the right.
D6-D7/	214 - 215	Hand glider flying upwards to the right.
D8-D9/	216 - 217	Hang glider getting ready to land or has just taken off.
DA-DB/	218 - 219	Hang glider on the ground just about to take off or has just landed.
DC-DD/	220 - 221	Hang glider on the ground pilot under canopy
DE-DF /	222-223	Hang glider on the ground.

Getting it all in

Type in the basic loader as published and *save it – don't run it* or it will self-destruct. Before running the loader program you will need to reset the computer and type the following:

```
POKE43,0:POKE44,64:POKE
16384,0:NEW and press RETURN.
```

This will trick the computer into believing that the Basic now starts at $4000 instead of $0801. Load in the Basic loader and run it; if error free, the program will automatically save itself as a block of data. If you reload that data in the future remember to add a 1 after the device number. The data is saved in the following location $2800-$37FF.

The sprites run from 160 to 223 in a compromise to avoid the area $2000 traditionally set aside for redefined character graphics and to avoid the need of typing in line after line of data.

If only one or two sprites are required then use this formula:
(Sprite block No.-160)* + 190 = the data line number at which that sprite blocks data starts.

Remember to type in the following three lines of data and alter the variable BL to the number of data lines you have in your finished program, less 1.

The small basic program Aircraft Display will animate the sprites in both non-expanded and expanded forms on the screen simultaneously. To hold on any sprite enter the same number for Start and End.

Any Sprite Editor program will enable you to change and adapt the individual sprites to your own requirements. YC

Lister 128

If you've got a printer and disk drive, you'll find the program a handy utility for your 128.

By Kevin Blight

Using Lister 128 will enable you to take a program saved on disk as an ASCII file and list it to the printer. Nothing extraordinary in that, you may think, except that the program does not have to be loaded into memory. Well, Lister will also perform a few other things. First the listing is printed as pages (50 lines to a page); this will mean that the most important line is not printed across the perforations (as normally happens).

Each page is given a heading of your choice, together with the date. All lines of the program are indented so all lines start in a straight line, irrespective of the line numbers. If a line occupies more than one line on the print out the continuation will also be indented, e.g.

```
1000        REM THIS IS A TEST
            LINE IT WILL BE SPLIT
            OVER TWO LINES
```

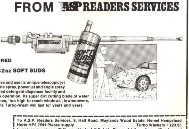
You will have the option to list the program in either upper or lower case characters. A page throw is executed at the end of the listing. To save a program as an ASCII file enter:

```
DOPEN # 1,"<FILENAME>,S,W"
CMD1
LIST
PRINT #1
DCLOSE
```

Once the listing is finished you will have the option of deleting the ASCII file. The variables used are as follows:

See listing on page 83

F$: Name of the file to list
N$: Heading for listing
D$: Date for listing
P$: = "U" or "L" for upper or lower case
L : Counter – Number of lines printed
P : CHR$ code for lettering to use for printer (U=145 / L=17)
A$: Characters read from disk file
L$: Line to print
A : Counter Length of L$
B$: Line number and spaces for indenting
SP$: String of 9 spaces
X : Used in FOR/NEXT loop for page throw
Q$: List another program Y/N



Listings

Get it right first time with our deluxe program system for the C64.

You may have noticed that our listings are free of those horrible little black blobs which send you searching around the keyboard for a suitable graphic symbol. You may also have noticed the funny numbers by the side of each line of the listing. Fret no more, it's all part of our easy entry aid.

Instead of those nasty graphics and rows of countless spaces in PRINT statements and strings we use a special coding system. The code, or mnemonic, is always contained in square brackets and you'll soon learn to decipher their meanings.

For example, [SA] would mean type in a Shifted A, or an ace of spades in layman's terms, and [SA10] would mean a row of ten of these symbols.

[S+2] means hold down the shift key and press the plus key twice. It doesn't take a great leap of logic to realise that [C+2] means exactly the same thing except that the Commodore key (bottom left of the keyboard) is held down instead of the shift key.

If more than two spaces appear in a statement then this will be printed as [SPC4] or, exceptionally, [SSPC4]. Translated into English this means press the spacebar four times or in the latter case hold the shift key down while you do it.

A string of special characters could appear as:

[CTRL N, DOWN2,LEFT5,BLUE, F3,C3]

This would be achieved by holding down the CTRL key as you press N, press the cursor key down twice, the cursor left key five times, press the key marked BLUE while holding down the CTRL key, press the F3 key and, finally hold the Commodore key down while pressing the number two key (C2 would of course make the computer print in brown).

Always remember that you should only have a row of graphics characters on your screen with no square brackets and no commas, unless something like this appears:

[SS],[C*]

In this case the two characters should have a comma between them.

On rare occasions [REV T] will appear in a listing. This is a delete symbol and is created by entering the line up to this mnemonic. Then type a closing quotation mark (SHIFT & 2) and delete it. This gets the computer out of quotes mode. Hold down CTRL and press the number nine key (RVSON), type the relevant number of reversed T's and then hold down CTRL and press zero (RVSOFF). Next type another quotation mark and delete it again. Now finish the line and press RETURN.

A list of these special cases is given in the table but remember that only one of these mnemonics will appear outside of a PRINT string: the symbol for pi. This may appear when its value is needed in a calculation so this may look something like:

:CC=2*[PI]*R:

Ignore the square brackets and just type in a shifted upward pointing arrow (ie. the pi symbol).

PROGRAM: SYNTAX CHECKER

```
5 REM SYTAX CHECKER - ERIC DOYLE

10 BL=10    :LN=70    :SA=49152
20 FOR L=0 TO BL:CX=0:FOR D=0 TO
 15
30 READ A:IF A>255THENPRINT"NUMB
ER TO LARGE";LN+(L*10):STOP
40 CX=CX+A:POKE SA+L*16+D,A:NEXT
 D
50 READ A:IF A><CX THENPRINT"ERR
OR IN LINE";LN+(L*10):STOP
60 NEXT L:SYS 49152:NEW
70 DATA 173,5,3,201,165,208,31,1
20,169,9,141,32,208,141,33,208,1
847
80 DATA 169,7,141,134,2,169,13,3
2,210,255,169,64,141,4,3,169,168
2
90 DATA 192,141,5,3,88,96,120,16
9,124,141,4,3,169,165,141,5,1566

100 DATA 3,169,14,141,134,2,141,
32,208,169,6,141,33,208,88,96,15
85
110 DATA 32,124,165,72,138,72,15
2,72,162,0,165,20,133,254,165,21
,1747
120 DATA 24,101,254,133,254,189,
0,2,240,18,69,254,133,254,232,18
9,2346
130 DATA 0,2,240,8,24,101,254,13
3,254,232,208,233,169,1,141,134,
2134
140 DATA 2,165,254,74,74,74,74,3
2,156,192,32,210,255,165,254,41,
2054
150 DATA 15,32,156,192,32,210,25
5,169,13,32,210,255,169,13,32,21
0,1995
160 DATA 255,169,7,141,134,2,104
,168,104,170,104,96,24,105,48,20
1,1832
170 DATA 58,16,1,96,24,105,7,96,
0,0,0,0,0,0,0,0,403
```

by Eric Doyle

Checksum Program

The hexadecimal numbers appearing in a column to the left of the listing should not be typed in with the program. These are merely checksum values and are there to help you get each line right. Don't worry if you don't understand the hexadecimal system, as long as you can compare two characters on the screen with the corresponding two characters in the magazine you can use our line checking program.

Type in the Checksum Program, make sure that you've not made any mistakes and save it to tape or disk immediately because it will be used with most of the present and future listings appearing in Your Commodore.

At the start of each programming session, load Checksum and run it. The screen will turn brown with yellow characters and each time you type in a line and press the RETURN key a number will appear on the screen in white. This should be the same as the corresponding value in the magazine.

If the two values don't relate to one another, you have not copied the line exactly as printed so go back and check each character carefully. When you find the error simply correct it and press RETURN again.

If you want to turn off the checker simply type SYS49152 and the screen will return to the familiar blue colours. You can then do whatever it was you wanted to do and if this doesn't use the area where Checksum lies you can go back to it with the same SYS command.

Lower Case

Many of the listings are presented in lower case. To turn your computer to lower case mode press the Commodore key and the SHIFT key at the same time.

Mnemonic	Symbol	Keypress
[RIGHT]	]	CRSR left/right
[LEFT]	│	SHIFT & CRSR left/right
[DOWN]	Q	CRSR up/down
[UP]	●	SHIFT & CRSR up/down
[F1]	▔	f1 key
[F2]	◣	SHIFT & f1 key
[F3]	▁	f3 key
[F4]	◥	SHIFT & f3 key
[F5]	│	f5 key
[F6]	◤	SHIFT & f5 key
[F7]	│	f7 key
[F8]	L	SHIFT & f7 key
[HOME]	S	CLR/HOME
[CLR]	♥	SHIFT & CLR/HOME
[RVSON]	R	CTRL & 9
[RVSOFF]	▁	CTRL & 0

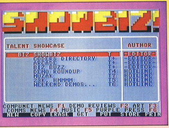
Mnemonic	Symbol	Keypress
[BLACK]	┐	CTRL & 1
[WHITE]	E	CTRL & 2
[RED]	£	CTRL & 3
[CYAN]	◥	CTRL & 4
[PURPLE]	▚	CTRL & 5
[GREEN]	↑	CTRL & 6
[BLUE]	←	CTRL & 7
[YELLOW]	π	CTRL & 8
[POUND]		£
[LARROW]		←
[UPARROW]		↑
[PI]		SHIFT & ↑
[INST]		SHIFT & INST/DEL
[REV T]		see text
[Cletter]		CBM + letter
[Sletter]		SHIFT + letter

Compunet

In the third part of our communications series, we look at the various uses of Compunet.

By Jennifer Goldsmith

Compared to other communications services, Compunet is a relatively new system. Its official launch was in September 1974 and was a joint venture of Commodore UK and ADP Network Services with ADP providing the service and Commodore providing the modems. However, once Commodore was no longer able to provide the modems or to continue to repair the faulty existing ones, they pulled out and left ADP on its own.



```
TALENT SHOWCASE                              AUTHOR
      BIZ SHOWBIZ                     T     -EDITOR-
          CODERS DIRECTORY            T+    -EDITOR-
          ARCADE                      T+    -EDITOR-
          BIZ BUZZ                    T+    -EDITOR-
          DEMO ROUNDUP                T4    HOTLINE
          MUZAK                       T7    HOTLINE
          23K  HMMMM                  T5    HOTLINE
          WEEKEND DEMOS....           T6    HOTLINE
COMPUNET NEWS F1 DEMO REVIEWS F2 ART F3
 COMMS NEWS F4 MUSIC F5 PURPLE PRESS F6
NEW    COPY ERASE GET   PUT   STORE PRIN
```

Security Advantages – Modem

However, the Commodore modem was not all bad for the chip in the modem, provided both the software to access Compunet and a unique identity which ADP could use as security. This security is used in two ways. Firstly, it is used when you log on to the system for you can only log on using your own modem. When you register with Compunet, you have to provide an identity number of your modem, so even if you have the correct password but try to log on using your friend's modem, you will not be allowed on the system.

The second use of the identity number is in downloading protected programs, as protected programs will only run on your computer if your modem is in place. Unprotected programs, on the other hand will run without your modem in place. On Compunet, protected programs are denoted by the letters PP and unprotected programs by a single P.

Logging on to Compunet

Once you have obtained your modem and have acquired and fitted the telephone jack, you can plug your modem into the phone line (see October's issue for more details), you have to register with them.

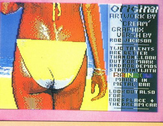
This is necessary for two reasons. Firstly they have to know who to charge and the address to which bills and other correspondence can be sent, and also to give you a user identity and password. The user I.D. will be used by other users on the system to send you mail. Once you have registered and plugged your modem into both your computer and the phone line, you are all set to dial up.

To do this you simply type CONNECT (return) and the computer will ask you for the phone number which you type in, not forgetting to hit return afterwards. The modem will then dial the computer and when you are connected the screen colour changes from blue to mauve and various words like 'connecting' are seen. You will also see the word 'linking'. This linking process is giving you some extra software which you should save immediately once you have left the system. You save it with the command CNSAVE (return).

On future occasions you load this software with the command CNLOAD before typing CONNECT. This additional software stores the phone number you have used, so you will not have to type in the phone number again unless you want to use a different phone number.

The Charges

The various charges are quite numerous but easy to understand and are cheap when you consider what you get for your money. There are three different rates of subscription, basic at £9 per quarter, standard at £12 per



Original
ARTWORK BY
'CREAM'
GRAPHIX
VERSH BY
ROB JACKSON

TWO TALENTS
ARE BETTER
THAN ONE.LOOK
OUT FOR MARK
AND ROB DEMOS
STARTING WITH
RAINBOW
MAKER IN
METAL BAR

LOOK OUT ALSO
FOR-
BOBS PLACE +
THE DREAM CAR

quarter and gold at £15 per quarter. You can upgrade from one to the other at any time by paying the difference between the two rates.

However, to downgrade you have to give one months notice and you can only downgrade when subscriptions are due. The rate which is suitable to you, will depend on how much you want to upload onto the system and/or how long you want to spend on the system. Details will be supplied by Compunet when you apply for registration and full details are on the system.

There are also connect charges, storage, distribution and administration, as well as miscellaneous charges. However, before you turn white with fright, let me tell you it is not that bad. The most significant charge is the connect time charge.

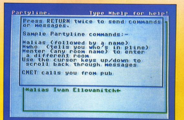
Although this charge is 60p an hour after 6pm in the evenings (weekdays) and all day at the weekend, if you use the system for more than five hours a quarter it is worth upgrading to a gold account and paying a fixed £3 a quarter for unlimited free connect time in the evenings and weekends. There is no substitute for the daytime weekday charge (from 8am to 6pm) of £4 per hour but usually only business users access Compunet during those hours. Storage charges of 1p/frame/day/ are small unless you have many frames on the system, in which case a gold account may be preferable.

Distribution charges, are like commission rates. If you want to sell something e.g. a program on Compunet, Compunet will take between 40% and 50% of the price as its share.

Administration charges are only charged if your bank refuses to pay a cheque or a direct debit (once you have filled in the mandate).

Miscellaneous charges are for special facilities, many of which are only available to gold subscribers. Details can be found on the system.

DIR	:reveals another directory
SHOW	reveals a text frame
BACK	returns to the previous directory
GOTO	goes directly to the frame with that number or name
UCAT	displays a catalogue of your uploaded frames
MAIL	accesses the electronic mailbox
ACCNT	shows you your bill
SAVE	saves a downloaded program
EDITR	accesses the editor
LEAVE	disconnects you from Compunet (this is the only way you should disconnect from Compunet otherwise you may get charged more connect time)
PRINT	prints the current frame
LIFE	used to extend the life of a frame
BUY	used to download software
LOAD	loads a frame or progam from disk into the memory of your computer
UPLD	uploads a text frame or program onto the system
VOTE	the Compunet clap-ometer – allows you to vote on software
HELP	for when you get stuck



```
Partyline.                Type *help for help!
Press RETURN twice to send commands
or messages.

Sample Partyline commands:-

*alias (followed by a name)
*who  (tells you who's in pline)
*enter (any room name) to enter
 a different room
Use the cursor keys up/down to
 scroll back through messages

CNET calls you from pub

*alias Ivan Ellovanitch←
```

Finding Your Way Around

Once you are logged on to Compunet, you will notice that there is a whole series of commands near the bottom of the frame. The other name for this is the duckshoot. Here is a list of the commands with a short explanation.

The editor is an area which allows you to print out frames and to edit. The editor stores the last 12 frames (excluding indexes) which you have accessed. In some areas of Compunet you will find there are 'forms' to fill in, e.g. if you want to join a club you can edit or fill in these 'forms' in the editor without going off line and send them using the mail facility to the correct recipient.

The editor also exists off-line for you to inspect and edit frames. The editor can hold up to 8K of data. The editor commands are:

PUT	used to save the frame currently on the screen to disk
STORE	saves ALL the frames in the editor to disk
PRINT	prints the current frame
FREE	shows how much space is left (in editor)
GET	similar to LOAD but frames go into editor
RETURN	exits from editor to where you were before you went into editor
HELP	for when you get stuck
EDIT	when you first enter the editor you are not in edit mode. You have to use this command to be able to edit
LAST	when you first enter the editor you see the last frame you accessed. To proceed 'backwards' you use this command
NEXT	if you have used LAST and want to proceed 'forwards'
NEW	erases the current frame WITHOUT showing the next frame
ERASE	erases the current frame AND shows the next frame
COPY	to copy from one area to another

The Structure of Compunet

When you are at the first page, the main index, which is the first index page you will see on the system, you will notice a list of names. These are, at the time of writing: Cnet Highlights, About Cnet, Live Wire, S'ware park, Club 128, Zap Club, The Jungle, Comms, Show Case and Shopping Centre.

As you use the cursor to reach the item you want, you will notice that there are numbers of names to the left of the items – these are the page numbers of names. To the immediate right of the item is the letter T followed by a + sign. T indicates that a frame of text is present and the + sign means that there is a sub-directory.

Other letters apart from T can be found. These are D, P and PP. D indicates a 'dummy' page, P a program and PP a protected program. There is a column to the extreme right of the screen. Use the function keys f7 and f8 (shifted f7) and see what happens!

Function keys f1 to f6 are used as short cuts to various routes. Each index shows where these will go. Compunet has a tree structure, i.e. a main index with a sub-directory below each one of the directory items listed and so on.

However, in Compunet there is no limit to the number of levels you may have and the page numbers have no bearing on the levels, unlike Prestel.

What's on Compunet

It is obviously both impossible and impractical to list everything on Compunet. Things are changing every day. Basically, Compunet has something to please everyone, whether it is multi-user games, art gallery, demos, educational software, business software, reviews, communications, utilities, clubs, users groups including ICPUG and ICC, hobbies like CHESS and amateur radio, teleshopping, daily computer news and much, much more.

One interesting and unique area is the JUNGLE, which is the area which you can enter your own contributions. This can be anything from notes and comments to long stories and even software. Yes, you can even sell, yes SELL your own software, at a price to be determined by you, which should be reasonable for the product. Of course Compunet takes its commission but you get the best part. This area gives you a chance to get other people's views on you ideas.

There are six main areas in the JUNGLE, which are software, small ads, clubs and societies (excluding those which have a dedicated area of their own), hobby corner, user noticeboard and jobspot. Thus, the JUNGLE is an exciting ever-changing area.

MUD or Multi-User Dungeon, is an adventure game which was originally developed at Essex University and has become the rage since it was made available on Compunet. The only disadvantage with the excitement MUD provides is the charge for playing it PLUS the phone bill!!

Telesoftware on Compunet is numerous and varied. There are free programs of all descriptions whether it is a user giving away his latest program of all kinds, e.g. utilities, educational, etc.

Likewise you can purchase software for numerous tasks from communications and utilities to business software. And there is software for various commodore machines, such as the C64, C128, Amiga and even the PET & +4 & C16.

The Future of Compunet

When Compunet first started, the system was terribly slow but in July, ADP moved to a new location, with new phone numbers, new phone lines, new computer, new software but the same staff. After the initial teething problems such as BT and the fact that most telesoftware needs to be re-written in a different language for the new computer, the system is proving faster and therefore friendlier.

ADP has some great plans for Compunet, and some should come into effect before the end of 1987. Amiga users should soon be able to access Compunet with of course, an Amiga modem.

C64 and C128 users will eventually be able to use a modem other than the black box. It is hoped that overseas users will be able to use PSS which would be a great help to those in Eire. There are even plans for non-Commodore machines like the Atari ST and IBM to access the system. It is all very exciting, so if you want to find out what the future holds, then join in and find out!

DISKIT 8

Please refer to Listings before typing in any programs.

```
PROGRAM: MEM CLEAR BOOT
```

```
43   10 M1=32768:M2=34992:CH=0
97   11 PRINTCHR$(144)CHR$(147)
A2   12 POKE53280,15:POKE53281,12
94   13 PRINT
8F   14 PRINTSPC(8)CHR$(18)"[SU,S*
     22,SI]
26   15 PRINTSPC(8)CHR$(18)"[S-,SP
     C22,S-]
B4   16 PRINTSPC(8)CHR$(18)"[S-,SP
     C4]DATA  STATEMENT[SPC3,S-]
3C   17 PRINTSPC(8)CHR$(18)"[S-,SP
     C22,S-]
E5   18 PRINTSPC(8)CHR$(18)"[S-]
     TO MEMORY  ROUTINE  [S-]
4A   19 PRINTSPC(8)CHR$(18)"[S-,SP
     C22,S-]
22   20 PRINTSPC(8)CHR$(18)"[S-,SP
     C5]BY LES ALLAN[SPC5,S-]
50   21 PRINTSPC(8)CHR$(18)"[S-,SP
     C22,S-]
6C   22 PRINTSPC(8)CHR$(18)"[SJ,S*
     22,SK]
A0   23 PRINT:PRINTCHR$(155)
42   24 PRINT" THIS ROUTINE READS
     THE DATA STATEMENT,"
80   25 PRINT
17   26 PRINT" CONVERTS FROM  HEX
     TO BINARY AND POKES"
82   27 PRINT
C4   28 PRINT" CODE BACK  TO THE
     AREA OF MEMORY FROM"
84   29 PRINT
19   30 PRINT" WHICH  IT  WAS  PRE
     VIOUSLY  GENERATED."
59   31 PRINT:PRINT
D0   32 READCODE$
BB   33 LB=ASC(RIGHT$(CODE$,1))-48
     :IFLB>9THENLB=LB-7
CF   34 HB=ASC(LEFT$(CODE$,1))-48:
     IFHB>9THENHB=HB-7
A5   35 CH=CH+LB+HB
37   36 PRINTSPC(5)CHR$(5)"READING
      MEMORY BLOCK ...":M1:PRINTCH
     R$(145);
95   37 POKEM1,HB*16+LB:M1=M1+1:IF
     M1<M2THEN32
E6   38 IFCH<>27136THENPRINTCHR$(1
     47)"ERROR IN CHECKSUM!!!!!":E
     ND
5F   39 SYS34896
12   40 :
2A   41 ::::::::::DATUM STATEMENTS
     :::::::::
10   42 :
9F   43 DATA 00,0B,08,01,00,9E,34,
     30,38,30,00,00,00,45,47,D0
39   44 DATA 72,74,75,7F,77,6B,76,
     72,7D,D0,72,74,75,7F,76,6B
16   45 DATA 76,75,47,76,4F,44,47,
     DE,80,6F,76,73,70,6E,7D,DE
F5   46 DATA 47,1E,4F,43,47,DE,E1,
     71,6E,65,D7,55,92,84,84,84
60   47 DATA 84,84,84,84,84,84,84,
     84,84,84,84,84,84,84,84,84
73   48 DATA 84,84,84,84,84,84,84,
     8E,47,C7,4F,42,47,DE,E1,71
30   49 DATA 6E,65,55,9A,67,67,67,
     67,67,67,67,67,67,67,67,67
28   50 DATA 67,67,67,67,67,67,67,
     67,67,67,67,67,67,67,9A,47
69   51 DATA E0,4F,41,47,DE,E1,71,
     6E,65,55,9A,67,67,67,67,67
9B   52 DATA 67,67,67,67,67,67,67,
     67,67,67,67,67,67,67,67,67
21   53 DATA 67,67,67,67,67,9A,47,
     89,4F,40,47,DE,E1,71,6E,65
F7   54 DATA 55,9A,67,67,67,67,E7,
     0A,02,0A,08,15,1E,67,67,06
40   55 DATA 0B,0B,67,04,0B,02,06,
     15,67,67,67,67,9A,47,B2,4F
E8   56 DATA 4F,47,DE,E1,71,6E,65,
     55,9A,67,67,67,67,67,67,67
6E   57 DATA 67,67,67,67,67,67,67,
     67,67,67,67,67,67,67,67,67
86   58 DATA 67,67,67,9A,47,5B,4E,
     4E,47,DE,E1,71,6E,65,55,9A
6C   59 DATA 67,67,67,67,67,67,67,
     67,67,67,67,67,67,67,67,67
38   60 DATA 67,67,67,67,67,67,67,
     67,67,67,9A,47,04,4E,4D,47
19   61 DATA DE,E1,71,6E,65,55,9A,
     67,67,E7,10,15,0E,13,13,02
7A   62 DATA 09,67,05,1E,67,0B,02,
     14,67,06,0B,0B,06,09,67,67
16   63 DATA 67,9A,47,2D,4E,4C,47,
     DE,E1,71,6E,65,55,9A,67,67
A7   64 DATA 67,67,67,67,67,67,67,
     67,67,67,67,67,67,67,67,67
5E   65 DATA 67,67,67,67,67,67,67,
     67,9A,47,D6,4E,4B,47,DE,E1
14   66 DATA 71,6E,65,55,9A,67,67,
     67,67,67,67,67,67,67,67,67
07   67 DATA 67,67,67,67,67,67,67,
     67,67,67,67,67,67,67,67,9A
C5   68 DATA 47,FE,4E,4A,47,DE,E1,
     71,6E,65,55,8D,84,84,84,84
7A   69 DATA 84,84,84,84,84,84,84,
     84,84,84,84,84,84,84,84,84
04   70 DATA 84,84,84,84,84,84,8C,
     DC,47,86,4E,49,47,DE,7D,DE
13   71 DATA 47,A8,4E,48,47,DE,65,
     67,67,13,0F,0E,14,67,17,15
F5   72 DATA 08,00,15,06,0A,67,01,
     0E,0B,0B,14,67,0A,02,0A,08
C8   73 DATA 15,1E,67,01,15,08,0A,
     67,63,77,7F,77,77,65,47,5A
E3   74 DATA 4D,57,47,DE,65,67,67,
     13,08,67,63,01,01,01,01,67
E2   75 DATA 10,0E,13,0F,67,63,77,
     77,67,14,08,67,67,13,0F,06
62   76 DATA 13,67,67,10,0F,02,09,
     67,13,0F,02,65,47,0C,4D,56
7E   77 DATA 47,DE,65,67,67,17,15,
     08,00,15,06,0A,67,14,06,11
80   78 DATA 02,03,67,67,10,0E,13,
     0F,67,67,0A,02,0A,08,15,1E
A9   79 DATA 67,14,06,11,02,15,67,
     0E,14,65,47,3E,4D,55,47,DE
24   80 DATA 65,67,67,04,15,12,09,
     04,0F,02,03,67,67,04,08,0A
96   81 DATA 0A,08,09,67,67,04,08,
     03,02,67,0E,14,67,15,02,03
F6   82 DATA 12,04,02,03,67,13,08,
     65,47,E0,4D,54,47,DE,65,67
75   83 DATA 67,17,15,08,03,12,04,
     02,67,67,06,67,67,14,0A,06
02   84 DATA 0B,0B,02,15,67,67,10,
     08,15,0C,0E,09,00,67,17,15
3F   85 DATA 08,00,15,06,0A,65,47,
     E8,4D,53,47,DE,7D,DE,47,9A
3F   86 DATA 4D,52,47,DE,65,67,67,
     12,14,02,67,67,13,0F,0E,14
89   87 DATA 67,67,10,0E,13,0F,67,
     0A,02,0A,08,15,1E,67,14,06
5C   88 DATA 11,02,15,67,06,09,03,
     67,08,09,02,65,47,4C,4C,51
9F   89 DATA 47,DE,65,67,67,17,06,
     15,13,67,0A,06,0C,02,15,67
95   90 DATA 13,08,67,14,0E,0A,17,
     0B,0E,01,1E,67,14,06,11,02
D4   91 DATA 67,15,08,12,13,0E,09,
     02,14,65,47,5A,4C,50,47,CC
FC   92 DATA 85,6F,76,7E,70,6E,F5,
     71,73,E0,75,74,47,6E,4C,5F
5F   93 DATA 47,DE,80,6F,76,73,70,
     6E,47,15,4C,5E,47,DE,65,67
29   94 DATA 67,76,69,67,67,67,0B,
     08,06,03,67,61,67,15,12,09
39   95 DATA 67,0A,02,0A,08,15,1E,
     67,06,0B,0B,67,04,0B,02,06
0C   96 DATA 15,47,C7,4C,5D,47,DE,
     7D,DE,65,67,67,75,69,67,67
19   97 DATA 67,0B,08,06,03,67,0E,
     09,67,17,15,08,00,15,06,0A
8B   98 DATA 67,01,08,15,67,04,08,
     09,11,02,15,14,0E,08,09,47
00   99 DATA F7,4C,5C,47,DE,7D,DE,
     65,67,67,74,69,67,67,67,0B
82   100 DATA 08,06,03,67,60,0A,02
     ,0A,76,60,6B,7F,6B,76,67,61
CB   101 DATA 67,0B,08,06,03,60,0A
     ,02,0A,75,60,6B,7F,6B,76,47
65   102 DATA 98,4C,5B,47,DE,7D,DE
     ,65,67,67,73,69,67,67,67,06
18   103 DATA 03,03,67,14,1E,14,67
     ,04,08,03,02,67,6F,0E,69,02
17   104 DATA 69,67,67,77,67,14,1E
     ,14,67,75,77,71,76,6E,47,4B
D5   105 DATA 4B,5A,47,DE,7D,DE,65
     ,67,67,72,69,67,67,67,14,1E
52   106 DATA 14,67,7F,75,7F,67,13
     ,08,67,14,06,11,02,67,60,0A
C6   107 DATA 06,0E,09,60,67,60,0C
     ,02,15,09,60,47,65,4B,59,47
F1   108 DATA DE,65,67,67,67,67,67
     ,67,67,61,67,60,05,08,08,13
72   109 DATA 60,47,17,4B,58,47,DE
     ,7D,DE,65,67,67,71,69,67,67
1E   110 DATA 67,04,15,12,09,04,0F
     ,67,60,0A,06,0E,09,60,67,01
09   111 DATA 0E,0B,02,67,06,09,03
     ,67,0E,01,67,0B,02,14,14,47
9C   112 DATA 3A,4B,67,47,DE,65,67
     ,67,67,67,67,67,67,13,0F,06
D9   113 DATA 09,67,76,72,73,67,05
     ,0B,08,04,0C,14,67,12,14,02
BB   114 DATA 67,08,09,02,67,17,06
     ,15,13,67,11,76,47,E5,4B,66
94   115 DATA 47,DE,65,67,67,67,67
     ,67,67,67,13,08,67,14,06,11
10   116 DATA 02,67,04,08,0A,17,0B
     ,02,13,02,67,0A,02,0A,08,15
5C   117 DATA 1E,47,8A,4B,65,47,DE
     ,7D,DE,65,67,67,67,67,67,67
E8   118 DATA 67,0E,01,67,04,0F,06
     ,15,06,04,13,02,15,67,15,06
41   119 DATA 0A,67,12,09,12,14,02
     ,03,67,06,09,03,47,B0,4B,64
13   120 DATA 47,DE,65,67,67,67,67
     ,67,67,67,04,15,12,09,04,0F
38   121 DATA 02,03,67,60,0A,06,0E
     ,09,60,67,01,0E,0B,02,67,0E
69   122 DATA 14,67,0B,02,14,14,47
     ,63,4A,63,47,DE,65,67,67,67
4A   123 DATA 67,67,67,67,13,0F,06
     ,09,67,76,70,77,67,05,0B,08
3D   124 DATA 04,0C,14,67,12,14,02
     ,67,08,09,02,67,17,06,15,13
49   125 DATA 67,11,75,47,09,4A,62
     ,47,DE,7D,DE,65,67,67,70,69
40   126 DATA 67,67,67,0B,08,06,03
     ,67,60,0A,02,0A,74,60,67,08
6A   127 DATA 15,67,60,0A,02,0A,73
     ,60,67,6B,7F,6B,76,47,3A,4A
2A   128 DATA 61,47,DE,7D,DE,65,67
     ,67,7F,69,67,67,67,14,1E,14
B0   129 DATA 67,7F,75,7F,67,13,08
     ,67,04,15,02,06,13,02,67,08
B1   130 DATA 09,02,67,17,06,15,13
     ,67,01,0E,0B,02,47,C8,4A,6F
F8   131 DATA 47,CC,85,6F,76,7E,70
     ,6E,F5,71,73,E0,73,77,47,DD
F0   132 DATA 4A,6E,47,D9,67,73,76
     ,76,7F,47,E7,4A,6D,47,7D,47
E5   133 DATA 8F,4A,6C,47,7D,7D,7D
     ,7D,7D,7D,7D,7D,7D,7D,7D,7D
39   134 DATA 7D,7D,7D,7D,7D,7D,7D
     ,7D,7D,7D,7D,7D,7D,7D,7D,7D
E9   135 DATA 7D,7D,7D,7D,7D,7D,7D
     ,47,B7,4A,6B,47,7D,7D,7D,7D
7F   136 DATA 7D,7D,7D,7D,7D,7D,7D
     ,7D,7D,7D,7D,7D,7D,7D,7D,7D
C0   137 DATA 7D,7D,7D,7D,7D,7D,7D
     ,7D,7D,7D,7D,7D,7D,7D,7D,47
33   138 DATA 5F,49,6A,47,7D,7D,67
     ,67,67,67,67,67,67,67,67,67
BC   139 DATA 67,67,67,67,67,67,67
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    ,67,67,67,67,67,67,67,67,67
4D  140 DATA 67,67,67,67,67,7D,7D
    ,47,78,49,69,47,7D,7D,67,67
FB  141 DATA 67,0A,02,0A,F7,1E,67
    ,67,06,0B,0B,67,04,0B,02,06
C7  142 DATA 15,67,17,15,08,00,15
    ,06,0A,67,67,67,7D,7D,47,20
99  143 DATA 49,68,47,7D,7D,67,67
    ,67,67,67,67,67,67,67,67,67
F7  144 DATA 67,67,67,67,67,67,67
    ,67,67,67,67,67,67,67,67,67
5B  145 DATA 67,67,67,67,7D,7D,47
    ,C8,49,77,47,7D,7D,67,67,67
C8  146 DATA 10,15,0E,13,13,02,09
    ,67,05,1E,67,67,67,67,67,67
73  147 DATA 0B,02,14,67,06,0B,0B
    ,06,09,67,67,67,7D:7D,47,F0
9F  148 DATA 49,76,47,7D,7D,67,67
    ,67,67,67,67,67,67,67,67,67
CA  149 DATA 67,67,67,67,67,67,67
    ,67,67,67,67,67,67,67,67,67
DB  150 DATA 67,67,67,67,7D,7D,47
    ,9A,49,75,47,7D,7D,67,67,67
35  151 DATA 75,7F,67,06,13,0C,0E
    ,09,14,D6,67,03,15,0E,11,02
10  152 DATA 67,67,09,60,17,F7,13
    ,67,67,67,7D,7D,47,42,48,74
FA  153 DATA 47,7D,7D,67,67,67,67
    ,67,67,67,67,67,67,67,67,67
FD  154 DATA 67,67,67,67,67,67,67
    ,67,67,67,67,67,67,67,67,67
AB  155 DATA 20,20,3A,3A,00,2D,0F
    ,34,00,3A,3A,3A,3A,3A,3A,3A
13  156 DATA 3A,3A,3A,3A,3A,3A,3A
    ,3A,3A,3A,3A,3A,3A,3A,3A,3A
C6  157 DATA 3A,3A,3A,3A,3A,3A,3A
    ,3A,3A,3A,3A,3A,00,55,0F,35
A3  158 DATA 00,3A,3A,3A,3A,3A,3A
    ,3A,3A,3A,3A,3A,3A,3A,3A,3A
70  159 DATA 3A,3A,3A,3A,3A,3A,3A
    ,3A,3A,3A,3A,3A,3A,3A,3A,3A
B2  160 DATA 3A,3A,3A,3A,00,00,00
    ,38,00,3A,3A,3A,3A,3A,3A,3A
F6  161 DATA 3A,3A,3A,3A,3A,3A,3A
    ,3A,3A,3A,3A,3A,3A,3A,3A,3A
B0  162 DATA 3A,3A,3A,3A,3A,3A,3A
    ,3A,3A,3A,3A,3A,00,00,00,38
20  163 DATA 00,3A,3A,3A,3A,3A,3A
    ,3A,3A,3A,3A,3A,3A,3A,3A,3A
1B  164 DATA 3A,3A,3A,3A,3A,3A,3A
    ,3A,3A,3A,3A,3A,3A,3A,3A,3A
EF  165 DATA 3A,3A,3A,3A,00,00,00
    ,38,00,3A,3A,3A,3A,3A,3A,3A
19  166 DATA 3A,3A,3A,3A,3A,3A,3A
    ,3A,3A,3A,3A,3A,3A,3A,3A,3A
50  167 DATA 3A,3A,3A,3A,3A,3A,3A
    ,3A,3A,3A,3A,3A,00,00,00,00
4D  168 DATA 00,00,EE,EE,EE,EE,EE
    ,EE,EE,EE,EE,EE,EE,EE,EE,EE
8E  169 DATA EE,EE,EE,EE,EE,EE,EE
    ,EE,EE,EE,EE,EE,EE,EE,EE,EE
80  170 DATA A9,23,8D,0B,08,A9,08
    ,8D,0C,08,A9,00,85,FB,A9,08
88  171 DATA 85,FC,A0,0D,B1,FB,49
    ,47,91,FB,C8,D0,F7,E6,FC,A5
22  172 DATA FC,C9,0F,D0,EF,60,A2
    ,00,BD,26,10,9D,A7,02,E8,E0
22  173 DATA 59,D0,F5,4C,A7,02,78
    ,A9,34,85,01,A9,00,85,FB,A2
72  174 DATA 08,86,FC,91,FB,C8,D0
    ,FB,E6,FC,D0,F7,A9,37,85,01
BD  175 DATA 58,4C,66,FE,00,00,00
    ,00,00,00,00,00,00,00,00,00
4D  176 DATA A9,00,A8,85,FB,85,FD
    ,A9,80,85,FC,A9,08,85,FE,B1
7F  177 DATA FB,91,FD,C8,D0,F9,E6
    ,FC,E6,FE,A5,FC,C9,A0,D0,EF
5F  178 DATA A9,08,AA,A8,20,BA,FF
    ,A9,0C,A2,94,A0,08,20,BD,FF
84  179 DATA A9,01,85,2B,A9,08,85
    ,2C,A9,2B,A2,50,A0,10,20,D8
32  180 DATA FF,4C,66,FE,4D,45,4D
    ,4F,52,59,20,43,4C,45,41,52
AA  181 DATA 00,00,00,00,00,00,00
    ,00,00,00,00,00,00,00,00,00
8C  182 :
8D  183 :
80  184 ::::::::::::::::::::::::::
    ::::::::::::
06  185 :  MEMORY ALL CLEAR  BY L
    ES ALLAN   :
BA  186 :
                :
22  187 : KIND ASSISTANCE BY GAVI
    N SELLMAN  :
8B  188 : FOR HIS 64 WHEN MINE WA
    S BROKEN!  :
C1  189 :
                :
BF  190 :   28 ATKINSON DRIVE NEW
    PORT IW     :
BF  191 :
                :
08  192 ::::::::::::::::::::::::::
    ::::::::::::
```

PROGRAM: DISK-MANAGER

```
84  1 rem ******************
52  2 rem * program to load *
b8  3 rem *   disk manager  *
8b  4 rem *                 *
13  5 rem *  by m.e.catley  *
27  6 rem ******************
63  10 bl=104  :ln=70   :sa=5158
    0
f9  20 for l=0 to bl:cx=0:for d=
    0 to 15
9f  30 read a:if a>255thenprint"
    number to large":ln+(l*10):s
    top
28  40 cx=cx+a:poke sa+l*16+d,a:
    next d
a9  50 read a:if a><cx thenprint
    "error in line":ln+(l*10):st
    op
92  60 next l
27  70 data 205,165,205,106,206,
    38,205,128,205,147,206,248,2
    07,1,206,24,2502
cd  80 data 206,43,205,55,205,10
    1,205,142,5,83,69,76,69,67,8
    4,32,1647
e5  90 data 67,72,79,73,67,69,58
    ,32,32,32,32,32,32,32,194,13
    ,916
72  100 data 29,29,29,29,29,29,2
    9,29,18,32,146,194,32,32,32,
    32,750
5b  110 data 32,32,32,32,32,32,3
    2,32,32,32,32,32,32,32,32,32
    ,512
35  120 data 32,0,233,112,64,64,
    64,64,64,64,64,64,64,64,64,6
    4,1145
5e  130 data 64,64,64,64,64,64,6
    4,64,64,110,160,66,4,9,19,11
    ,955
fb  140 data 32,13,1,14,1,7,5,18
    ,32,13,32,3,1,20,12,5,209
2d  150 data 25,66,160,107,64,64
    ,64,64,64,64,64,64,64,64,64,
    64,1126
85  160 data 64,64,64,64,64,64,6
    4,64,64,115,160,66,3,32,45,3
    2,1029
fd  170 data 3,15,16,25,32,6,9,1
    2,5,32,32,32,32,32,32,32,347
4c  180 data 32,66,160,66,30,32,
    45,32,19,1,22,5,32,6,9,12,56
    9
d3  190 data 5,32,32,32,32,32,32
    ,32,32,66,160,66,18,32,45,32
    ,680
fd  200 data 18,5,14,1,13,5,32,6
    ,9,12,5,32,32,32,32,32,280
38  210 data 32,66,160,66,6,32,4
    5,32,6,15,18,13,1,20,32,4,54
    8
87  220 data 9,19,11,32,32,32,32
    ,32,32,66,160,66,0,32,45,32,
    632
28  230 data 18,5,19,5,20,32,4,1
    8,9,22,5,32,32,32,32,32,317
82  240 data 32,66,160,66,24,32,
    45,32,5,24,9,20,32,21,20,9,5
    97
ce  250 data 12,9,20,25,32,32,32
    ,32,32,66,160,66,11,32,45,32
    ,638
9a  260 data 11,9,12,12,32,21,20
    ,9,12,9,20,25,32,32,32,32,32
    0
e6  270 data 32,66,160,66,19,32,
    45,32,19,3,18,1,20,3,8,32,55
    6
7c  280 data 6,9,12,5,32,32,32,3
    2,32,66,160,66,22,32,45,32,6
    15
35  290 data 22,1,12,9,4,1,20,5,
    32,4,9,19,11,32,32,32,245
9d  300 data 32,66,160,66,12,32,
    45,32,12,15,1,4,32,6,9,12,53
    6
7a  310 data 5,32,40,44,56,41,32
    ,32,32,66,160,66,31,32,45,32
    ,746
b0  320 data 12,15,1,4,32,6,9,12
    ,5,32,40,44,56,44,49,41,402
df  330 data 32,66,160,66,9,32,4
    5,32,9,14,9,20,9,1,12,9,525
a0  340 data 19,5,32,4,9,19,11,3
    2,32,66,160,107,64,64,64,64,
    752
c3  350 data 64,64,64,64,64,64,6
    4,64,64,64,64,64,64,64,64,64
    ,1024
0d  360 data 64,115,160,66,19,5,
    12,5,3,20,32,3,8,15,9,3,539
50  370 data 5,58,32,32,32,32,32
    ,32,32,66,160,66,32,32,32,32
    ,707
de  380 data 32,32,32,32,32,32,3
    2,32,32,32,32,32,32,32,32,32
    ,512
38  390 data 32,66,160,109,64,64
    ,64,64,64,64,64,64,64,64,64,
    64,1135
a2  400 data 64,64,64,64,64,64,6
    4,64,64,125,160,160,160,160,
    160,160,1661
99  410 data 160,160,160,160,160
    ,160,160,160,160,160,160,160
    ,160,160,160,160,2560
c8  420 data 160,105,169,15,162,
    8,160,15,32,186,255,173,51,2
    07,162,54,1914
a7  430 data 160,207,32,189,255,
    76,192,255,32,40,204,169,135
    ,160,207,32,2345
1a  440 data 30,171,162,17,160,1
    0,24,32,240,255,169,130,160,
    207,32,30,1829
be  450 data 171,32,228,255,240,
    244,201,13,240,65,201,20,208
    ,11,169,157,2455
68  460 data 32,210,255,206,51,2
    07,76,214,203,201,31,144,221
    ,201,96,176,2524
40  470 data 217,32,210,255,174,
    51,207,157,54,207,238,51,207
    ,76,214,203,2553
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fd   480 data 162,0,142,51,207,17
     4,51,207,157,54,207,232,169,
     48,157,54,2072
fd   490 data 207,232,169,58,157,
     54,207,232,142,51,207,96,162
     ,16,160,10,2160
61   500 data 24,32,240,255,169,1
     48,160,201,32,30,171,162,16,
     160,10,24,1834
60   510 data 76,240,255,169,188,
     160,207,76,203,203,169,154,1
     60,207,76,203,2746
38   520 data 203,169,173,160,207
     ,76,203,203,32,40,204,169,23
     5,160,207,32,2473
1a   530 data 30,171,32,228,255,2
     40,251,201,78,208,5,104,104,
     76,127,206,2316
e2   540 data 201,89,208,238,96,1
     69,177,141,234,204,169,252,1
     41,237,204,169,2929
ca   550 data 254,141,235,204,169
     ,0,133,254,169,8,162,4,160,1
     60,32,224,2309
70   560 data 204,169,0,133,254,1
     69,8,162,216,160,164,76,224,
     204,169,1,2313
12   570 data 133,43,162,8,134,44
     ,32,186,255,169,0,141,51,207
     ,32,144,1741
5c   580 data 255,32,77,204,173,5
     1,207,162,54,160,207,76,189,
     255,169,177,2448
c0   590 data 141,234,204,169,252
     ,141,235,204,169,254,141,237
     ,204,169,0,133,2887
96   600 data 254,169,8,162,4,160
     ,160,32,224,204,169,0,133,25
     4,169,8,2110
d3   610 data 162,216,160,164,133
     ,252,134,253,132,255,162,19,
     160,23,177,252,2654
db   620 data 145,254,136,16,249,
     169,40,24,101,252,133,252,14
     4,2,230,253,2400
fc   630 data 169,24,24,101,254,1
     33,254,144,2,230,255,202,16,
     222,96,169,2295
17   640 data 177,141,234,204,169
     ,252,141,237,204,169,254,141
     ,235,204,169,206,3137
80   650 data 133,254,169,8,162,4
     ,160,201,32,224,204,169,169,
     141,234,204,2468
08   660 data 169,1,141,235,204,1
     69,8,162,216,76,224,204,160,
     0,32,154,2155
0b   670 data 204,169,0,162,1,160
     ,8,32,213,255,8,169,192,32,1
     44,255,2004
0c   680 data 40,176,15,134,45,13
     4,47,134,49,132,46,132,48,13
     2,50,32,1346
c5   690 data 94,166,169,0,141,51
     ,207,76,182,205,160,1,76,58,
     205,160,1951
14   700 data 1,32,154,204,169,43
     ,166,45,164,46,32,216,255,16
     9,192,32,1920
58   710 data 144,255,76,94,205,1
     69,78,32,12,204,32,63,204,32
     ,84,204,1888
f9   720 data 76,182,205,169,73,7
     6,46,206,169,85,141,54,207,1
     69,74,141,2073
d5   730 data 55,207,169,2,141,51
     ,207,76,182,205,169,67,32,12
     ,204,32,1811
3e   740 data 70,204,169,61,32,17
     ,204,32,196,203,32,174,203,3
     2,40,204,1873
ea   750 data 169,207,160,207,32,
     30,171,162,15,32,198,255,162
     ,0,32,207,2039
f5   760 data 255,201,13,240,6,15
     7,54,207,232,208,243,162,3,1
     89,54,207,2431
50   770 data 201,44,240,6,32,210
     ,255,232,208,243,173,54,207,
     13,55,207,2380
a5   780 data 201,49,208,22,232,1
     69,32,32,210,255,189,54,207,
     201,48,240,2349
73   790 data 3,32,210,255,189,55
     ,207,32,210,255,32,204,255,1
     69,15,32,2155
ab   800 data 195,255,169,254,133
     ,161,165,161,208,252,76,127,
     206,169,83,32,2646
d8   810 data 12,204,32,77,204,32
     ,84,204,76,182,205,169,82,76
     ,168,205,2012
3a   820 data 169,86,32,12,204,76
     ,182,205,173,141,2,201,6,240
     ,3,108,1840
0f   830 data 52,207,173,52,207,1
     74,53,207,120,141,20,3,142,2
     1,3,88,1663
1a   840 data 56,32,240,255,142,4
     7,207,140,48,207,173,134,2,1
     41,49,207,2080
ed   850 data 173,33,208,141,50,2
     07,165,252,72,165,253,72,165
     ,254,72,165,2447
3d   860 data 255,72,32,186,204,1
     69,0,141,33,208,133,207,169,
     1,141,134,2085
60   870 data 2,133,204,32,11,205
     ,32,228,255,240,251,162,11,2
     21,94,207,2288
e0   880 data 240,6,202,16,248,76
     ,130,206,138,10,170,189,124,
     201,72,189,2217
3d   890 data 125,201,72,189,106,
     207,133,254,189,107,207,133,
     255,160,20,177,2535
35   900 data 254,73,128,145,254,
     136,16,247,76,40,204,174,47,
     207,172,48,2221
9e   910 data 207,24,32,240,255,1
     69,0,133,204,169,1,133,207,1
     73,49,207,2203
30   920 data 141,134,2,173,50,20
     7,141,33,208,165,1,41,254,13
     3,1,32,1716
a5   930 data 113,204,165,1,9,1,1
     33,1,104,170,104,168,104,133
     ,255,104,1769
44   940 data 133,254,104,133,253
     ,104,133,252,152,72,138,72,9
     6,32,183,206,2317
e1   950 data 32,34,207,108,52,20
     7,32,183,206,108,52,207,173,
     20,3,201,1825
ad   960 data 52,208,10,173,21,3,
     201,206,240,24,173,20,3,141,
     52,207,1734
16   970 data 173,21,3,141,53,207
     ,169,52,162,206,120,141,20,3
     ,142,21,1634
88   980 data 3,88,96,0,0,0,0,0,0
     ,0,0,0,0,0,0,0,187
72   990 data 0,0,0,0,0,0,0,0,0,0
     ,0,0,0,0,0,0,0
78   1000 data 0,0,0,0,0,0,0,0,0,
     0,0,0,0,0,0,0,0
87   1010 data 0,0,67,94,82,70,64
     ,88,75,83,86,76,95,73,130,4,
     1087
5c   1020 data 170,4,210,4,250,4,
     34,5,74,5,114,5,154,5,194,5,
     1237
c6   1030 data 234,5,18,6,58,6,17
     5,32,157,157,0,69,78,84,69,8
     2,1230
63   1040 data 32,79,76,68,32,70,
     73,76,69,78,65,77,69,0,69,78
     ,1011
3c   1050 data 84,69,82,32,78,69,
     87,32,70,73,76,69,78,65,77,6
     9,1110
a0   1060 data 0,69,78,84,69,82,3
     2,70,73,76,69,78,65,77,69,0,
     991
86   1070 data 69,78,84,69,82,32,
     68,73,83,75,32,78,65,77,69,4
     4,1078
f2   1080 data 73,68,0,68,73,83,7
     5,32,83,84,65,84,85,83,58,32
     ,1046
73   1090 data 32,32,32,13,29,29,
     29,29,29,29,29,29,29,29,0,65
     ,464
1e   1100 data 82,69,32,89,79,85,
     32,83,85,82,69,63,32,91,89,4
     7,1109
1d   1110 data 78,93,0,0,0,0,0,0,
     0,0,0,0,0,0,0,0,171
40   1120 poke43,124:poke44,201:p
     oke45,0:poke46,208
e2   1130 save"disk manager",8
39   1140 print"[clr]disk manager
      activated":sys53000
de   1150 poke43,1:poke44,8:new
```

PROGRAM TYPRO

```
100 rem typro  p.g.simonds  dece
mber 1986
101 rem
102 rem
104 rem to help type this progra
m into your computer, all lines
containing
105 rem print(ed) control charac
ters are followed by a rem(ark)
line describing
106 rem the characters.
107 rem
108 rem these rem lines, with a
line number ending with 1, i.e.
4221, need not
109 rem be typed in & 5276,1526,
4036,7024 and 14076 need not be
typed in. other
110 rem rem(ark) lines before li
ne 1000 need not be typed in.  a
ll other rem
111 rem statements should be lef
t in as they mark the start of s
ections called
112 rem in goto statements.
113 rem
114 rem
115 rem
116 rem  examples of mnemonics u
sed
117 rem
118 rem
119 rem  [clr]   shift & clr/hom
e
120 rem
121 rem  [down]  cursor down
122 rem
123 rem  [up]    cursor up
124 rem
125 rem  [left]  cursor left
126 rem
127 rem  [right] cursor right
128 rem
129 rem  [down2] cursor down, tw
ice
130 rem
131 rem  [down2,right,etc] is on
```

```
e print statement of cursor down
 twice,cursor
132 rem                      right
 once, followed by any printed t
ext.
133 rem
134 rem  [down] & [up] describes
 separate print statements on a
single line.
135 rem
136 rem  [revon] reverse on - co
ntrol & 9
137 rem
138 rem  [revoff] reverse off -
control & zero
139 rem
140 rem  [flashon] flash on - co
ntrol & comma (,)
141 rem
142 rem  [flashoff] flash off -
control & full stop (.)
143 rem
144 rem  [s+0] shift & zero
145 rem
146 rem  [s+*] shift & *
147 rem
148 rem  [s+-] shift & -
149 rem
150 rem  [black] control & 1 (et
c.)
151 rem
152 rem  [orange] commodore logo
 & 1 (etc.)
153 rem
154 rem  [home] clear/home
155 rem  [etc] shows that text f
ollows the control characters.
156 rem
157 rem  [space7] shows 7 spaces
.
158 rem
1000 rem typro - writer and proc
esser - p g simonds - december,1
986
1010 print"(clr)(wht)":open4,4,7
:color4,1:color0,9,4:printchr$(1
4):vol2:print#4
1011 rem [clr,white]
1015 n=1:a=15:b=15:c=146:d=17:s=
0:pp=0:w=0:a$="":ns$="":rf=0:d$=
"":rs=1:gg$=""
1020 di=200:dimm$(di):dima(di):d
imb(di):dimc(di):dimm1$(di):dimm
2$(di):dimd(di)
1030 a(1)=15:b(1)=15:c(1)=146:d(
1)=17:m1$(1)="(orng)(brn)":m2$(1
)="(orng)(brn)"
1031 rem [orange,brown] & [orang
e,brown]
1040 print"(clr)(down)(down)(dow
n)(down)(rght)(rght)(rght)menu o
r new page or old? (m/n/o)":getk
eyns$:ifns$="o"then9030
1041 rem [clr,down4,right3,etc]
1045 ifns$="m"thenmd=1:goto4170:
elseifns$="n"then1050:else1040
1050 input"(down)(down)(down)(do
wn)(down)(down)(down)(rght)(rght
)(rght)characters per line? (2-1
64)":w:ifw>164orw<2then1050
1051 rem [down7,right3,etc]
1060 z=0:print"(clr)(down)(down)
a=";a,:print"b=";b,:print"c=";c,
:print"d=";d:ifn=0thenn=1
1061 rem [clr,down2,etc]
1070 b$="":print"(rvs)line numbe
r";n;"(off)":gosub2000:print"(rv
s)($130)↑(off)($132)(left)":
1071 rem [revon,etc] & [revoff]
& [revon,flashon,s+0,revoff,flas
hoff,left]
1080 rem composition and line pr
inting mode
1085 getkeya$
1090 ifa$="(rght)"ora$=" "thena$
=" ":goto1340
1091 rem [right] & [space] & [sp
ace]
1100 ifa$="-"ora$="←"ora$="-"ora
$="="then1340
1101 rem [s+*] & [s+-] & [minus]
 & [equals]
1110 ifa$=chr$(157)andlen(b$)=0t
hen1080
1120 ifa$=chr$(20)andlen(b$)=0th
en1080
1130 ifa$=chr$(144)thena=15:goto
1440
1140 ifa$=chr$(18)thenprintchr$(
18);:rf=1:goto1080
1150 ifa$=chr$(5)thena=14:goto14
40
1160 ifa$=chr$(28)thenb=15:goto1
440
1170 ifa$=chr$(159)thenb=8:goto1
440
1180 ifa$=chr$(13)thena$="":goto
1080
1190 ifa$=chr$(34)thenb$=b$+chr$
(34):printchr$(34);chr$(34);"(le
ft)(rvs)($130)↑(off)($132)(left)
";:goto1370
1191 rem [left,revon,flashon,s+0
,revoff,flashoff,left]
1200 ifa$=chr$(157)thena$=chr$(2
0)
1210 ifa$=chr$(156)thenc=18:rf=1
:printchr$(18);:goto1440
1220 ifa$=chr$(30)thenc=146:rf=0
:goto1440
1230 ifa$=chr$(146)thenprinta$;:
rf=0:goto1080
1235 ifa$=chr$(20)then1610
1240 ifa$=chr$(20)thenb$=left$(b
$,(len(b$)-1)):print"(off) (left
)(left)(rvs)($130)↑(off)($132)(l
eft)";:goto1080
1241 rem [revoff,space,left2,rev
on,flashon,s+0,revoff,flashoff,l
eft]
1250 ifa$=chr$(129)ora$=chr$(149
)ora$=chr$(150)ora$=chr$(151)the
n1080
1260 ifa$=chr$(153)ora$=chr$(154
)ora$=chr$(155)ora$=chr$(152)the
n1080
1270 ifa$=chr$(147)ora$="(up)"or
a$="(down)"ora$=chr$(148)then108
0
1271 rem [up] & [down]
1280 ifa$=chr$(31)thend=145:prin
tchr$(142);:goto1440
1290 ifa$=chr$(158)thend=17:prin
tchr$(14);:goto1440
1295 ifa$="."ora$=":"thens=1
1300 ifa$=chr$(27)andle=1then513
0
1310 ifa$=chr$(27)andle=0thenn=n
-1:b$="":goto4000
1320 ifa$="(home)"andle=0thenpri
nt" ":goto3000
1321 rem [home]
1330 ifa$="(home)"andle=1thenpri
nt" ":goto5140
1331 rem [home]
1340 b$=b$+a$
1350 ifrf=1orc=18thenprintchr$(1
8);
1360 printa$;
1370 iflen(b$)<w+zthenprint"(rvs
)($130)↑(off)($132)(left)":
1371 rem [revon,flashon,s+0,revo
ff,flashoff,left]
1380 iflen(b$)>(w+z-10)thensound
1,1000,5
1390 iflen(b$)>(w+z-5)thensound1
,800,5
1400 iflen(b$)>(w+z-3)thensound1
,600,50
1410 iflen(b$)>(w+z-1)andle=1the
nprint:goto5140
1420 iflen(b$)>(w+z-1)andle=0the
nprint:goto3000
1430 goto1080
1435 rem display control codes
1440 iflen(b$)=0thenprint"(up)(u
p)";:goto1460
1441 rem [up2]
1450 forp=1tolen(b$):print"(left
)";:nextp:print"(up)(up)":
1451 rem [left] & [up2]
1460 print"(off)

1461 rem [revoff,space37]
1470 print"(up)":
1471 rem [up]
1480 ifc=18thenprintchr$(18):
1490 print"a=";a,:print"b=";b,:p
rint"c=";c,:print"d=";d:ifrf=1th
enprintchr$(18):
1500 print"(down)":
1501 rem [down]
1510 iflen(b$)-z=0andz=0then1525
1520 forp=1tolen(b$):print"(rght
)";:nextp
1521 rem [right]
1525 ifa$="(blk)"ora$="(wht)"ora
$="(pur)"ora$="(grn)"ora$="(blu)
"ora$=""thenprintchr$(148);" ":
1526 rem[black]& [white] & [purp
le] & [green] & [blue] & [yellow
] & [space,left]
1530 ifa$="(pur)"thenb$=b$+chr$(
18):z=z+1:print"(rvs)($130)(blk)
5(wht)(off)($132)":
1531 rem [purple] & [revon,flash
on,black,5,white,revoff,flashoff
]
1540 ifa$="(grn)"thenb$=b$+chr$(
146):z=z+1:print"(rvs)($130)(blk
)6(wht)(off)($132)":
1541 rem [green] & [revon,flasho
n,black,6,white,revoff,flashoff]
1550 ifa$="(blk)"thenb$=b$+chr$(
15):z=z+1:print"(rvs)($130)(blk)
1(wht)(off)($132)":
1551 rem [black] & [revon,flasho
n,black,1,white,revoff,flashoff]
1560 ifa$="(wht)"thenb$=b$+chr$(
14):z=z+1:print"(rvs)($130)(blk)
2(wht)(off)($132)":
1561 rem [white] & [revon,flasho
n,black,2,white,revoff,flashoff]
1570 ifa$="(blu)"thenb$=b$+chr$(
145):z=z+1:print"(rvs)($130)(blk
)7(wht)(off)($132)":
1571 rem [blue] & [revon,flashon
,black,7,white,revoff,flashoff]
1580 ifa$="(yel)"thenb$=b$+chr$(
17):z=z+1:print"(rvs)($130)(blk)
8(wht)(off)($132)":
1581 rem [yellow] & [revon,flash
on,black,8,white,revoff,flashoff
]
1590 ifa$=chr$(20)then1240
1600 goto1080
1605 rem delete control codes in
side text
1610 z$=right$(b$,1)
1620 ifz$=chr$(15)thenz=z-1:a=14
:goto1690
1630 ifz$=chr$(14)thenz=z-1:a=15
:goto1690
1640 ifz$=chr$(18)thenz=z-1:c=14
6:rf=0:goto1690
1650 ifz$=chr$(146)thenz=z-1:c=1
```

```
8:rf=1:goto1690
1660 ifz$=chr$(145)thenz=z-1:d=1
7:printchr$(14);:goto1690
1670 ifz$=chr$(17)thenz=z-1:d=14
5:printchr$(142);:goto1690
1680 goto1240
1690 print" ";:printchr$(20);:go
to1440
2000 rem typing grid subroutine
2010 ifpp=0then2040:elseifw<2the
n1050:else2020
2020 printleft$(gg$,w-1);">";
2030 forp=1tow:print"(left)";:ne
xtp:return
2031 rem [left]
2040 g1$="    .    1    .    2
 .    3    .    4    .    5
.    6"
2050 g2$="    .    7    .    8
 .    9    .    c    .    11
.    1"
2060 g3$="2    .    13    .    14
 .    15    .    16    "
2070 gg$=g1$+g2$+g3$:pp=1
2080 goto2010
3000 rem print one line routine
3010 ifrf=1thenprintchr$(146)
3020 ifc=18thenprint#4,chr$(27);
"e";
3030 ifa=14thenprint#4,chr$(27);
"w";
3040 print#4,chr$(a);chr$(c);chr
$(d);b$;chr$(b);
3050 print#4,chr$(27);"x"
3060 s$(n)=b$:b$="":a(n)=a:b(n)=
b:c(n)=c:d(n)=d
3070 k=n:gosub8000
3080 getkeyc$:ifc$="c"then3100
3090 ifc$="m"then4000:elsesound1
,800,50:print"(down)   press 'c'
 or 'm'":goto3080
3091 rem [down,space3,etc]
3100 z=0:n=n+1:print:ifc=18thenp
rintchr$(18);
3110 print"a=";a,:print"b=";b,:p
rint"c=";c,:print"d=";d
3120 print"(rvs)line number";n:"
(off)":gosub2000:print"(rvs)($13
0)!(off)($132)(left)";:goto1080
3121 rem [revon,etc] & [revoff]
& [revon,flashon,s+0,revoff,flas
hoff,left]
4000 rem menu
4010 ifn<1thenn=0
4020 print:print"   m e n u - pr
ess h for help. m=":fre(8):md=0
4030 getkeyd$
4035 ifd$="c"andw<2thenprint"(cl
r)":goto1050
4036 rem [clr]
4040 ifd$="c"andmd=1thenprint"(c
lr)":goto3100:elseifd$="c"andmd=
0then3100
4041 rem [clr]
4050 ifd$="p"andmd=1thenprint"(c
lr)":goto6000:elseifd$="p"andmd=
0then6000
4051 rem [clr]
4060 ifd$="s"andmd=1thenprint"(c
lr)":goto7000:elseifd$="s"andmd=
0then7000
4061 rem [clr]
4070 ifd$="l"andmd=1thenprint"(c
lr)":goto9000:elseifd$="l"andmd=
0then9000
4071 rem [clr]
4080 ifd$="r"then10000
4090 ifd$="e"andmd=1thenprint"(c
lr)":goto5000:elseifd$="e"andmd=
0then5000
4091 rem [clr]
4100 ifd$="a"andmd=1thenprint"(c
lr)":goto11000:elseifd$="a"andmd
=0then11000
4101 rem [clr]
4110 ifd$="d"andmd=1thenprint"(c
lr)":goto13000:elseifd$="d"andmd
=0then13000
4111 rem [clr]
4120 ifd$="i"thendirectory:goto4
000
4130 ifd$="m"andmd=1thenprint"(c
lr)":goto14000:elseifd$="m"andmd
=0then14000
4131 rem [clr]
4140 ifd$="h"thenmd=1:goto4170
4150 ifd$=chr$(189)thenn=0:w=0:r
un1000
4160 goto4030
4170 print"(clr)(down)  add or d
elete line(s)..............a"
4171 rem [clr,down,space2,etc]
4180 print"(down)  continue next
 line of page........c"
4181 rem [down,space2,etc]
4190 print"(down)  copy line(s)
over other line(s)...d"
4191 rem [down,space2,etc]
4200 print"(down)  edit an exist
ing line..............e"
4201 rem [down,space2,etc]
4210 print"(down)  full menu on
screen................h"
4211 rem [down,space2,etc]
4220 print"(down)  index of file
s on disk.............i"
4221 rem [down,space2,etc]
4230 print"(down)  load file fro
m disk drive.........l"
4231 rem [down,space2,etc]
4240 print"(down)  merge disk fi
le with memory.......m"
4241 rem [down,space2,etc]
4250 print"(down)  print full or
 part copy of page...p"
4251 rem [down,space2,etc]
4260 print"(down)  review page f
rom line one.........r"
4261 rem [down,space2,etc]
4270 print"(down)  save file to
disk drive...........s"
4271 rem [down,space2,etc]
4280 print"(down)  (rvs)erase ol
d page and start next.com+x"
4281 rem [down,space2,revon,etc]
4290 goto4030
5000 rem edit line routine
5010 le=1
5020 input"(down)(down)(rght)(rg
ht)(rght)line number to be edite
d":ee
5021 rem [down2,right3,etc]
5030 ifee<1oree>nthen4000
5040 print"(rvs)line number";ee:
""
5041 rem [revon,etc] & [revoff]
5050 ifd(ee)=17thenprintchr$(14)
;
5060 ifd(ee)=145thenprintchr$(14
2);
5070 ifc(ee)=18thenprintchr$(18)
;
5080 av$=s$(ee):gosub5200:ifa(ee
)=0thena(ee)=15:b(ee)=15:c(ee)=1
46:d(ee)=17
5090 a=a(ee):b=b(ee):c=c(ee):d=d
(ee)
5100 print"(rvs)a=";a(ee),:print
"b=";b(ee),:print"c=";c(ee),:pri
nt"d=";d(ee)
5101 rem [revon,etc]
5110 z=0:print:gosub2000:print"(
rvs)($130)!(off)($132)(left)";
5111 rem [revon,flashon,s+0,revo
ff,flashoff,left]
5120 b$="":goto1080
5130 le=0:s$(ee)=s$(ee):b$="":a(
ee)=a:b(ee)=b:c(ee)=c:d(ee)=d:go
to5160
5140 le=0
5150 s$(ee)=b$:b$="":a(ee)=a:b(e
e)=b:c(ee)=c:d(ee)=d
5160 k=ee:gosub8000
5170 ifrf=1thenprintchr$(146):rf
=0
5180 goto4000
5200 rf=0:forp=1tolen(av$)
5210 va$=mid$(av$,p,1)
5220 ifva$=chr$(15)thenprint"(bl
k)(rvs)($130)1(off)($132)(wht)";
:goto5290
5221 rem [black,revon,flashon,1,
revoff,flashoff,white]
5230 ifva$=chr$(14)thenprint"(bl
k)(rvs)($130)2(off)($132)(wht)";
:goto5290
5231 rem [black,revon,flashon,2,
revoff,flashoff,white]
5240 ifva$=chr$(18)thenprint"(bl
k)(rvs)($130)5(off)($132)(wht)";
:print"(rvs)";:rf=1:goto5290
5241 rem [black,revon,flashon,5,
revoff,flashoff,white] & [revon]
5250 ifva$=chr$(146)thenprint"(b
lk)(rvs)($130)6(off)($132)(wht)"
;:print"(off)";:rf=0:goto5290
5251 rem [black,revon,flashon,6,
revoff,flashoff,white] & [revoff
]
5260 ifva$=chr$(145)thenprint"(b
lk)(rvs)($130)7(off)($132)(wht)"
;:printchr$(142);:goto5290
5261 rem [black,revon,flashon,7,
revoff,flashoff,white]
5270 ifva$=chr$(17)thenprint"(bl
k)(rvs)($130)8(off)($132)(wht)";
:printchr$(14);:goto5290
5271 rem [black,revon,flashon,8,
revoff,flashoff,white]
5275 ifrf=1thenprint"(rvs)";
5276 rem [revon]
5280 printva$;
5290 nextp
5300 print""
5310 return
6000 rem print whole or part pag
e routine
6010 print"(down)(rght)(rght)(rg
ht)print or menu? (p/m)"
6011 rem [down,right3,etc]
6015 getkeypp$:ifpp$="p"then6020
:elseifpp$="m"then4000:else6015
6020 print"(down)(down)(rght)(rg
ht)(rght)full or part print? (f/
p)"
6021 rem [down2,right3,etc]
6030 getkeyfp$:iffp$="f"then6040
:elseiffp$="p"then6100:else6030
6040 p=1
6050 ifc(p)=18thenprint#4,chr$(2
7);"e";
6060 ifa(p)=14thenprint#4,chr$(2
7);"w";
6070 print#4,chr$(a(p));chr$(c(p
));chr$(d(p));s$(p);chr$(b(p));
6080 print#4,chr$(27);"x"
6090 p=p+1:ifp>nthen4000:else605
0
6100 input"(down)(rght)(rght)(rg
ht)start printing line no.";sp
6101 rem [down,right3,etc]
6110 ifsp=0orsp>nthen4000
6120 input"(down)(rght)(rght)(rg
ht)end printing line no.";ep
6121 rem [down,right3,etc]
```

```
6130 ifep=0orep<spthen4000
6140 ifep>nthenep=n
6150 forp=sptoep
6160 ifc(p)=18thenprint#4,chr$(2
7);"e";
6170 ifa(p)=14thenprint#4,chr$(2
7);"w";
6180 print#4,chr$(a(p));chr$(c(p
));chr$(d(p));s$(p);chr$(b(p));
6190 print#4,chr$(27);"x"
6200 nextp
6210 goto4000
7000 rem save to disk
7010 print"(down)(down)(rght)(rg
ht)(rght)are you sure? (y/n)"
7011 rem [down2,right3,etc]
7020 getkeyr$:ifr$="y"then7023:e
lseifr$="n"then4000:else7020
7023 ifs=1thenprint"(down)(down)
(rght)(rght)(rght)file contains
',' or ':' ? (y/n)":else7030
7024 rem [down2,right3,etc]
7025 getkeycp$:ifcp$="y"thens=1:
goto7030:elseifcp$="n"thens=0:go
to7030:else7025
7030 input"(down)(down)(rght)(rg
ht)(rght)file name";nf$
7031 rem [down2,right3,etc]
7040 ifnf$="i"then7050:elseifnf$
="m"then4000:else7060
7050 directory:goto7030
7060 print"(down)(down)(down)(do
wn)(rght)(rght)(rght)saving file
 on disk."
7061 rem [down4,right3,etc]
7070 open1,8,2,"00:"+nf$+",s,w":
print#1,n:print#1,w:print#1,s
7080 fork=1ton
7090 ifa(k)=0thena(k)=15
7100 ifb(k)=0thenb(k)=15
7110 ifc(k)=0thenc(k)=146
7120 ifd(k)=0thend(k)=17
7130 ifm1$(k)=""orm1$(k)="(brn)"
thenm1$(k)="(orng)(brn)"
7131 rem [brown] & [orange,brown
]
7140 ifm2$(k)=""orm2$(k)="(brn)"
thenm2$(k)="(orng)(brn)"
7141 rem [brown] & [orange,brown
]
7150 print#1,m1$(k):print#1,m2$(
k):print#1,a(k):print#1,b(k):pri
nt#1,c(k)
7160 print#1,d(k)
7170 nextk
7180 close1
7190 print"(clr)":sound1,600,100
7200 goto4000
8000 rem format for disk subrout
ine
8010 ff$(1)="":ff$(2)="":ff$=""
8020 l=len(s$(k)):ifs$(k)=""then
ff$(1)=chr$(149):ff$(2)=chr$(149
):goto8120
8030 forp=1tol
8040 ll$=mid$(s$(k),p,1)
8060 ifll$=","thenll$=chr$(150)
8070 ifll$=":"thenll$=chr$(151)
8080 ff$=ff$+ll$
8090 nextp
8100 ifl<86thenff$(1)=ff$:ff$(2)
=chr$(149):goto8120
8110 ifl>85thenff$(1)=left$(ff$,
85):ff$(2)=right$(ff$,(l-85))
8120 m1$(k)=chr$(129)+ff$(1):m2$
(k)=chr$(129)+ff$(2)
8130 return
9000 rem load from disk
9010 print"(down)(down)(rght)(rg
ht)(rght)are you sure?  old file
 in memory       will be lost! (
y/n)"
9011 rem [down2,right3,etc]
9020 getkeyr$:ifr$="y"then9030:e
lseifr$="n"then4000:else9020
9030 input"(down)(down)(rght)(rg
ht)(rght)file name";nf$
9031 rem [down2,right3,etc]
9040 ifnf$="m"then4000:elseifnf$
="i"then9050:else9060
9050 directory:goto9030
9060 w=0:pp=0:print"(down)(down)
(down)(down)(rght)(rght)(rght)lo
ading file from disk."
9061 rem [down4,right3,etc]
9065 forp=0ton:s$(p)="":m1$(p)="
":m2$(p)="":nextp:n=0
9070 open1,8,2,"0:"+nf$+",s,r":i
nput#1,n:input#1,w:input#1,s
9080 fork=1ton
9090 input#1,m1$(k):input#1,m2$(
k):input#1,a(k):input#1,b(k):inp
ut#1,c(k)
9100 input#1,d(k)
9110 nextk
9120 close1:ifn=0thenprint"(up)(
rght)(rght)(rght)file not found.
              ":goto4000
9121 rem [up,right3,etc,space14]
9130 print"(clr)(down)translatin
g data from disk.";"(home)(down)
(down)(down)(down)(down)(down)ou
t of";n;"lines."
9131 rem [clr,down,etc] & [home,
down6,etc]
9140 fork=1ton:print"(home)(down
)(down)(down)on line";k
9141 rem [home,down3,etc]
9150 ff$(1)=right$(m1$(k),(len(m
1$(k))-1)):ff$(2)=right$(m2$(k),
(len(m2$(k))-1))
9160 ifff$(2)=chr$(149)thenff$=f
f$(1):goto9180
9170 ff$=ff$(1)+ff$(2)
9180 ifff$=chr$(149)thenff$="":s
$(k)=ff$:goto9270
9190 l=len(ff$):s$(k)=""
9195 ifs=0then9265
9200 forp=1tol
9210 ll$=mid$(ff$,p,1)
9230 ifll$=chr$(150)thenll$=","
9240 ifll$=chr$(151)thenll$=":"
9250 s$(k)=s$(k)+ll$
9260 nextp
9265 ifs=0thens$(k)=ff$
9270 nextk
9280 print"(clr)":sound1,600,100
9281 rem [clr]
9290 goto4000
10000 rem review page
10010 print"(clr)"
10011 rem [clr]
10020 rs=1
10030 print"(down)(rvs)line numb
er";rs;"(off)"
10031 rem [down,revon,etc] & [re
voff]
10040 ifd(rs)=17thenprintchr$(14
);
10050 ifd(rs)=145thenprintchr$(1
42);
10060 ifc(rs)=18thenprintchr$(18
);
10070 av$=s$(rs):gosub5200
10080 print"(rvs)a=";a(rs),:prin
t"b=";b(rs),:print"c=";c(rs),:pr
int"d=";d(rs)
10081 rem [revon,etc]
10090 getkeyrs$
10100 ifrs$="e"then5000
10110 ifrs$="(down)"thenrs=rs+1:
goto10160
10111 rem [down]
10120 ifrs$="(rght)"thenrs=rs+10
:goto10160
10121 rem [right]
10130 ifrs$="(up)"thenrs=rs-1:go
to10180
10131 rem [up]
10140 ifrs$="(left)"thenrs=rs-10
:goto10180
10141 rem [left]
10150 goto4000
10160 ifrs>nthenrs=n:ifrs=0thenr
s=1
10170 goto10030
10180 ifrs<=0thenrs=1
10190 goto10030
11000 rem add or delete line(s)
11010 dl$="":print"(down)(down)(
rght)(rght)(rght)add or delete l
ine(s)?  (a/d/m) "
11011 rem [down2,right3,etc]
11020 getkeydl$:ifdl$="a"then110
50
11030 ifdl$="d"then12000
11040 ifdl$="m"then4000:else1102
0
11050 al=n:input"(down)(down)(rg
ht)(rght)(rght)add line(s) after
 which line ";al
11051 rem [down2,right3,etc]
11060 ifal>nthen4000
11070 al$="":input"(down)(down)(
rght)(rght)(rght)text or graphic
 line(s)  (t/g)";al$
11071 rem [down2,right3,etc]
11080 ifal$="t"oral$="g"then1109
0:else4000
11090 la=0:input"(down)(down)(rg
ht)(rght)(rght)how many lines to
 be inserted";la:ifla=0orn+la>di
then4000
11091 rem [down2,right3,etc]
11100 n=n+la:aa=n
11110 do until aa=al+la
11120 s$(aa)=s$(aa-la):a(aa)=a(a
a-la):b(aa)=b(aa-la):c(aa)=c(aa-
la)
11130 d(aa)=d(aa-la):m1$(aa)=m1$
(aa-la):m2$(aa)=m2$(aa-la)
11140 aa=aa-1:loop
11150 forj=al+1toal+la
11160 s$(j)="":a(j)=15:b(j)=15:c
(j)=146:m1$(j)="(orng)(brn)":m2$
(j)="(orng)(brn)"
11161 rem [orange,brown] & [oran
ge,brown]
11170 d(j)=17:ifal$="g"thenh(j)=
8
11180 nextj
11190 print"(down)(rght)(rght)";
la;"line(s) added after line";al
;"(down)"
11191 rem [down,right2] & [down]
11200 print"(down)(rght)(rght)(r
ght)page length now";n;"lines."
11201 rem [down,right3,etc]
11210 goto4000
12000 rem delete line(s)
12010 hl=0:input"(down)(down)(rg
ht)(rght)(rght)how many lines to
 be deleted";hl:ifhl=0orhl>nthen
4000
12011 rem [down2,right3,etc]
12020 fd=0:input"(down)(down)(rg
ht)(rght)(rght)first line to be
deleted";fd:iffd=0orfd>n-hl+1the
n4000
12021 rem [down2,right3,etc]
12030 df=fd
12040 do until fd=n+1-hl
12050 s$(fd)=s$(fd+hl):a(fd)=a(f
d+hl):b(fd)=b(fd+hl):c(fd)=c(fd+
hl)
12060 d(fd)=d(fd+hl):m1$(fd)=m1$
(fd+hl):m2$(fd)=m2$(fd+hl)
12070 fd=fd+1
12080 loop
12090 forj=n+1-hlton
12100 s$(j)="":a(j)=15:b(j)=15:c
(j)=146:d(j)=17
12110 m1$(j)="(orng)(brn)":m2$(j
)="(orng)(brn)"
12111 rem [orange,brown] & [oran
ge,brown]
12120 nextj
12130 n=n-hl
12140 print"(down)(rght)(rght)":
hl;"lines deleted from line":df
12141 rem [down,right2]
12150 print"(down)(rght)(rght)(r
ght)page length now";n;"lines."
12151 rem [down,right3,etc]
12160 goto4000
13000 rem duplicate line(s)
13010 input"(down)(down)(rght)(r
ght)(rght)first line to be copie
d";fi
13011 rem [down2,right3,etc]
13020 iffi>norfi=0then4000
13030 input"(down)(down)(rght)(r
ght)(rght)last line to be copied
";la
13031 rem [down2,right3,etc]
13040 ifla<fithen13010
13050 ifla>nthenla=n
13060 bl=la-fi+1
13070 input"(down)(down)(rght)(r
ght)(rght)start line of copying"
;sl:ifsl+bl>dithen4000
13071 rem [down2,right3,etc]
13080 ifsl=fithen13010
13090 ss=n:ifsl+bl>nthenn=sl+bl-
1
13100 iffi>slthen13180
13110 p=bl-1
13120 s$(sl+p)=s$(fi+p):a(sl+p)=
a(fi+p):b(sl+p)=b(fi+p):c(sl+p)=
c(fi+p)
13130 d(sl+p)=d(fi+p):m1$(sl+p)=
m1$(fi+p):m2$(sl+p)=m2$(fi+p)
13140 p=p-1
13150 ifp>-1then13120
13160 print"(down)(down)(rght)(r
ght)(rght)copying complete.":pri
nt"(down)(rght)(rght)(rght)page
length";n;"lines."
13161 rem [down2,right3,etc] & [
down,right3,etc]
13170 ifsl>ss+1then13260:else400
0
13180 p=0
13190 do until p=bl
13200 s$(sl+p)=s$(fi+p):a(sl+p)=
a(fi+p):b(sl+p)=b(fi+p):c(sl+p)=
c(fi+p)
13210 d(sl+p)=d(fi+p):m1$(sl+p)=
m1$(fi+p):m2$(sl+p)=m2$(fi+p)
13220 p=p+1
13230 loop
13240 print"(down)(down)(rght)(r
ght)(rght)copying complete.":pri
nt"(down)(rght)(rght)(rght)page
length";n;"lines."
13241 rem [down2,right3,etc] & [
down,right3,etc]
13250 ifsl>ss+1then13260:else400
0
13260 forp=ss+1tosl-1
13270 a(p)=15:b(p)=15:c(p)=146:d
(p)=17:m1$(p)="(orng)(brn)":m2$(
p)="(orng)(brn)"
13271 rem [orange,brown] & [oran
ge,brown]
13280 nextp
13290 goto4000
14000 rem load merge file from d
isk
14010 print"(down)(down)(rght)(r
ght)(rght)do you wish to merge f
iles? (y/n)"
14011 rem [down2,right3,etc]
14020 getkeyr$:ifr$="y"then14030
:elseifr$="n"then4000:else14020
14030 input"(down)(down)(rght)(r
ght)(rght)merge file name";nf$
14031 rem [down2,right3,etc]
14040 ifnf$="m"then4000:elseifnf
$="i"then14050:else14060
14050 directory:goto14030
14060 pp=0:nn=0:print"(down)(dow
n)(down)(rght)(rght)(rght)
loading merge file from disk."
14061 rem [down4,right3,etc]
14070 open1,8,2,"0:"+nf$+",s,r":
input#1,nn:input#1,nw:input#1,u:
ifnw>wthenw=nw
14072 ifu=1thens=1
14075 ifn+nn>dithenprint"(down)(
down)(rght)(rght)(rght)merged fi
le would be too long!":close1:go
to4000
14076 rem [down2,right3,etc]
14080 fork=n+1ton+nn
14090 input#1,m1$(k):input#1,m2$
(k):input#1,a(k):input#1,b(k):in
put#1,c(k)
14100 input#1,d(k)
14110 nextk
14120 close1:ifnn=0thenprint"(up
)(rght)(rght)(rght)merge file no
t found.          ":goto4000
14121 rem [up,right3,etc,space14
]
14130 print"(clr)(down)translati
ng merge data from disk.":"(home
)(down)(down)(down)(down)(down)(
down)out of":n+nn;"lines."
14131 rem [clr,down,etc] & [home
,down6,etc]
14140 fork=n+1ton+nn:print"(home
)(down)(down)(down)on line";k
14141 rem [home,down3,etc]
14150 ff$(1)=right$(m1$(k),(len(
m1$(k))-1))
14155 ff$(2)=right$(m2$(k),(len(
m2$(k))-1))
14160 ifff$(2)=chr$(149)thenff$=
ff$(1):goto14180
14170 ff$=ff$(1)+ff$(2)
14180 ifff$=chr$(149)thenff$="":
s$(k)=ff$:goto14270
14190 l=len(ff$):s$(k)=""
14195 ifu=0then14265
14200 forp=1tol
14210 ll$=mid$(ff$,p,1)
14230 ifll$=chr$(150)thenll$=","
14240 ifll$=chr$(151)thenll$=":"
14250 s$(k)=s$(k)+ll$
14260 nextp
14265 ifu=0thens$(k)=ff$
14270 nextk
14280 n=n+nn:print"(clr)(down)(d
own)files merged. page length no
w";n;"lines.":sound1,600,100
14281 rem [clr,down2,etc]
14290 goto4000
```

PROGRAM: LISTER 128

```
10 rem "  *  *  *  LISTER 128
*  *  *
20 :
30 rem "  (C) Kevin Blight - Ap
ril 1987
40 :
50 print chr$(27)+"e":print chr$
(14);chr$(11)
60 trap 500:scnclr:poke 53280,25
1:char,10,0,"<<< LISTER 128 >>>"
70 char,0,3,"Lister 128 is a uti
lity to list a basic"
80 char,0,5,"program on the prin
ter without loading"
90 char,0,7,"the program into me
mory. The program "
100 char,0,9,"must have been sav
ed as an ASCII file."
110 char,0,11,"All printing take
s place in fast mode."
120 char,10,13,"----------------
"
130 poke 21,1:char,0,15,"Name of
 program to list : ":input f$:po
ke 21,0
140 if len(f$)<2 or len(f$)>16 t
hen 130
150 poke 21,1:char,0,17,"Heading
 : ":input h$:poke 21,0
160 if len(h$)<3 or len(h$)>30 t
hen print chr$(7);:goto 150
170 poke 21,1:char,0,19,"Date
 : ":input d$:poke 21,0
180 if len(d$)<2 or len(d$)>8 th
en 170
190 char,0,21,"Upper or lower ca
se print [U/L] : "
200 getkey p$:if p$="u" or p$="l
" then 210:else print chr$(7);:g
oto 200
210 if p$="l" then char,34,21,"L
OWER":else char,34,21,"UPPER"
220 fast:dopen#1,(f$)+",s,r":inp
ut#1,a$
230 open 3,4:print#3,chr$(14) ;h
$;" [";d$;"].":print#3,chr$(15):
l=2
240 if p$="u" then p=145:else if
 p$="l" then p=17
250 get#1,a$:if asc(a$)<48 or as
c(a$)>57 then 250
260 :
270 rem "  *  *  *  READ WHOLE O

F LINE  *  *  *
280 :
290 if l>50 then 300:else 320
300 for x=1 to 66-l:print#3,chr$
(15):next
310 print#3,chr$(14);h$;" [";d$;
"].":print#3,chr$(15):l=2
320 l$=""+a$:do while a$<>chr$(1
3)
330 get#1,a$:l$=l$+a$:loop
340 :
350 rem "  *  *  *  FORMAT LINE
FOR PRINTING  *  *  *
360 :
370 a=1:b$="":a$="":do while asc
 (a$) <> 32:a$=mid$(l$,a,1):b$=b
$+a$:a=a+1:loop:rem b$=line numb
er.
380 b$=left$(b$,len(b$)-1):l$=ri
ght$(l$,len(l$)-len(b$)-1)
390 sp$="        ":b$=b$+left$(
sp$,6-len(b$)):rem b$=line no +
spaces
400 l$=b$+l$
410 if len(l$)>80 then 420:else
450
420 a$="":a$=left$(l$,80)+"
"+right$(l$,len(l$)-80):l$=a$
430 if len(l$)>160 then 440:else
 450
440 a$="":a$=left$(l$,160)+"
 "+right$(l$,len(l$)-160):l$=a$
```

```
450 print#3,chr$(p);l$;:l=l+1
460 a$="":l$="":goto 290
470 :
480 rem "*  *  *  ERROR TRAPS  *
  *  *
490 :
500 if err=4 then scnclr:slow:pr
int "▓▓LIST FILE CANNOT BE FOUND
":goto 610
510 if err=5 then scnclr:slow:pr
int "▓▓DEVICE NOT CONNECTED":got
o 610
520 if err = 14 then 540
530 scnclr:slow:print "▓▓ERROR N
O :";err;" IN LINE NO";el:end
540 for x=1 to 66-l:print#3,chr$
(15):next
550 slow:scnclr:print:print:prin
t "List another program [Y/N] :
";
560 getkey q$:if q$="y" or q$="n
" then 570:else print chr$(7);:g
oto 560
570 print q$:print:print:print "
SCRATCH the ASCII file [Y/N] : "
;
580 getkey a$:if a$="y" or a$="n
" then 590:else print chr$(7);:g
oto 580
590 print a$:if a$="y" then scra
tch (f$)
600 if q$="y" then run:else dclo
se:end
610 print"▓▓PRESS ANY KEY TO CON
TINUE"
620 getkey q$:run
```

PROGRAM: EASY COUNT

```
ae   1 rem ********************
b1   2 rem *                  *
ff   3 rem * program to start *
c6   4 rem *    easy count    *
aa   5 rem *                  *
9a   6 rem *   by m.p.leech   *
ac   7 rem *                  *
47   8 rem ********************
e0   10 bl=62   :ln=50   :sa=4915
     2
5b   20 for l=0 to bl:cx=0:for d=
     0 to 15:read a:cx=cx+a:poke
     sa+l*16+d,a:next d
a5   30 read a:if a<>cx thenprint
     "error in line";ln+(l*10):st
     op
1c   40 next l:sys49287
19   50 data 169,0,133,144,169,36
     ,133,251,169,251,133,187,169
     ,0,133,188,2265
b2   60 data 169,1,133,183,169,8,
     133,186,169,96,133,185,32,21
     3,243,165,2218
dc   70 data 186,32,180,255,165,1
     85,32,150,255,164,144,208,61
     ,160,6,132,2315
ae   80 data 251,32,165,255,166,2
     52,133,252,164,144,208,46,16
     4,251,136,208,2827
21   90 data 238,164,252,32,205,1
     89,169,32,32,210,255,32,165,
     255,166,144,2540
44   100 data 208,24,170,240,6,32
     ,210,255,76,75,192,169,13,32
     ,210,255,2167
73   110 data 165,197,201,63,240,
     4,160,4,208,197,32,66,246,16
     0,0,185,2128
12   120 data 189,195,201,0,240,7
     ,32,210,255,200,76,111,192,3
     2,159,255,2354
ff   130 data 32,228,255,201,0,24
     0,246,169,240,141,32,208,169
     ,251,141,33,2586
a4   140 data 208,160,0,185,96,19
     4,201,0,240,7,32,210,255,200
     ,76,147,2211
33   150 data 192,32,218,192,160,
     0,185,168,194,201,0,240,7,20
     0,32,210,2231
f7   160 data 255,76,166,192,32,1
     59,255,32,228,255,201,0,240,
     246,201,13,2551
ae   170 data 240,15,170,169,147,
     32,210,255,138,201,68,240,1,
     96,76,0,2058
fa   180 data 192,169,0,133,251,1
     33,252,76,247,192,162,10,160
     ,5,24,32,2038
d3   190 data 240,255,162,121,202
     ,169,32,32,210,255,224,255,2
     08,246,162,10,2783
da   200 data 160,5,24,32,240,255
     ,96,32,218,192,160,0,185,10,
     195,201,2005
ad   210 data 0,240,7,200,32,210,
     255,76,252,192,160,0,32,207,
     255,201,2319
26   220 data 13,240,7,153,236,19
     5,200,76,12,193,132,253,169,
     146,153,236,2414
39   230 data 195,200,169,32,153,
     236,195,200,169,72,153,236,1
     95,200,169,65,2639
c3   240 data 153,236,195,200,169
     ,83,153,236,195,200,169,32,1
     53,236,195,200,2805
9a   250 data 169,18,153,236,195,
     200,169,0,153,236,195,165,25
     3,162,236,160,2700
46   260 data 195,32,189,255,169,
     3,162,8,160,2,32,186,255,32,
     192,255,2127
c1   270 data 201,98,208,27,32,18
     7,193,160,0,185,113,195,200,
     32,210,255,2296
ac   280 data 201,0,208,245,169,3
     ,32,195,255,32,204,255,76,16
     1,192,162,2390
40   290 data 3,32,198,255,32,207
     ,255,133,253,32,183,255,201,
     66,240,16,2361
22   300 data 165,253,201,128,240
     ,49,32,207,255,201,128,208,2
     49,76,199,193,2784
48   310 data 32,187,193,160,0,18
     5,151,195,200,32,210,255,201
     ,0,208,245,2454
47   320 data 169,3,32,195,255,32
     ,204,255,76,161,192,162,14,1
     60,5,24,1939
5c   330 data 32,240,255,96,32,20
     7,255,201,128,240,11,201,13,
     240,25,201,2377
1d   340 data 32,208,38,76,196,19
     3,32,207,255,201,59,240,231,
     201,194,240,2603
d9   350 data 227,201,13,240,223,
     76,214,193,160,0,32,207,255,
     201,13,208,2463
1d   360 data 214,200,192,5,240,3
     5,76,234,193,32,13,194,32,20
     7,255,201,2323
a1   370 data 32,208,3,76,196,193
     ,201,13,208,242,76,196,193,2
     30,251,165,2483
1f   380 data 251,201,0,240,1,96,
     230,252,96,32,187,193,169,18
     ,32,210,2208
9b   390 data 255,160,0,185,236,1
     95,201,0,240,7,200,32,210,25
     5,76,35,2287
d0   400 data 194,165,252,164,251
     ,32,145,179,32,221,189,32,30
     ,171,160,0,2217
65   410 data 185,212,195,201,0,2
     40,7,200,32,210,255,76,64,19
     4,169,3,2243
35   420 data 32,195,255,32,204,2
     55,76,161,192,0,0,0,0,0,0,0,
     1402
34   430 data 147,5,13,13,32,32,3
     2,32,32,32,32,32,18,69,65,83
     ,669
f3   440 data 89,32,83,67,82,73,8
     0,84,32,87,79,82,68,32,67,79
     ,1116
a6   450 data 85,78,84,69,82,146,
     13,13,32,32,32,32,32,32,32,3
     2,826
d3   460 data 32,32,32,32,18,77,4
     6,80,46,76,69,65,67,72,46,32
     ,822
62   470 data 74,65,78,56,55,146,
     0,0,80,82,69,83,83,32,82,69,
     1054
f2   480 data 84,85,82,78,32,75,6
     9,89,32,84,79,32,67,79,78,84
     ,1129
ea   490 data 73,78,85,69,13,145,
     32,32,32,32,32,80,82,69,83,8
     3,1020
3c   500 data 32,32,68,32,32,70,7
     9,82,32,84,72,69,32,68,73,82
     ,939
71   510 data 69,67,84,79,82,89,1
     3,32,32,32,32,32,80,82,69,83
     ,957
0c   520 data 83,32,65,78,89,32,7
     9,84,72,69,82,32,75,69,89,32
     ,1062
a7   530 data 84,79,32,65,66,79,8
     2,84,13,0,84,89,80,69,32,73,
     1011
7e   540 data 78,32,70,73,76,69,3
     2,78,65,77,69,32,65,78,68,32
     ,994
a5   550 data 80,82,69,83,83,32,8
     2,69,84,85,82,78,13,32,32,32
     ,1018
37   560 data 32,32,70,73,76,69,3
     2,78,65,77,69,32,73,83,32,58
     ,951
c3   570 data 45,13,32,32,32,32,3
     2,32,32,32,32,32,32,32,32,32
     ,506
b3   580 data 32,32,32,32,32,32,3
     2,32,32,32,32,32,32,32,32,32
     ,512
a7   590 data 32,32,32,32,32,32,3
     2,32,32,145,13,32,32,32,32,3
     2,606
86   600 data 0,63,32,78,79,32,70
     ,73,76,69,78,65,77,69,32,69,
     962
a2   610 data 82,82,79,82,32,63,4
     6,32,32,32,32,32,32,32,32,32
     ,754
ab   620 data 32,32,32,32,13,0,0,
     63,32,70,73,76,69,32,78,79,7
     13
03   630 data 84,32,70,79,85,78,6
     8,32,69,82,82,79,82,32,63,46
     ,1063
3c   640 data 32,32,32,32,32,32,3
     2,32,32,32,32,13,0,32,32,32,
     461
af   650 data 32,82,69,84,85,82,7
     8,32,84,79,32,67,79,78,84,73
     ,1120
53   660 data 78,85,69,0,146,32,8
     7,79,82,68,83,32,32,32,32,32
     ,969
aa   670 data 32,32,32,32,32,32,3
     2,32,32,32,13,0,0,0,0,0,333
```

PROGRAM: RELOCATOR.BAS

```
34   10 d=2049:l=1000
c2   20 t=0
0a   30 forx=1to8
8a   40 reada:ifa=-1then100
68   50 poked,a:d=d+1:t=t+a
be   60 next
c8   70 reada:ifa=-1then100
26   80 ift<>athenprint"error in
     line ";l:end
fc   90 l=l+10:goto20
df   100 ifd<>4203+1thenprint"add
     ress error":end
b6   110 poke43,1:poke44,8
93   120 poke45,108:poke46,16
0d   130 print"[down]saving reloc
     ator"
51   140 save"relocator",8:end
4e   150 rem change the '8' in th
     e previous line to '1' to sa
     ve to tape
1c   1000 data11,8,10,0,158,50,48
     ,54,339
b4   1010 data49,0,0,0,32,0,10,32
     ,123
ff   1020 data91,13,32,23,10,96,3
     2,198,495
79   1030 data9,147,84,65,80,69,3
     2,76,562
5f   1040 data79,65,68,73,78,71,3
     2,82,548
49   1050 data79,85,84,73,78,69,1
     3,0,481
fa   1060 data134,195,142,108,9,1
     32,196,140,1056
39   1070 data109,9,169,0,133,147
     ,133,144,844
e0   1080 data32,208,247,32,23,24
     8,32,175,997
b6   1090 data245,165,183,240,6,3
     2,234,247,1352
23   1100 data144,7,96,32,44,247,
     144,1,715
90   1110 data96,165,144,41,16,56
     ,240,1,759
6f   1120 data96,224,4,208,24,32,
     198,9,795
af   1130 data13,13,83,69,81,85,6
     9,78,491
cc   1140 data84,73,65,76,32,70,7
     3,76,549
00   1150 data69,13,0,56,96,224,1
     ,208,667
e2   1160 data26,32,198,9,13,13,8
     5,78,454
8b   1170 data80,82,79,84,69,67,8
     4,69,614
96   1180 data68,32,70,73,76,69,1
     3,0,401
e8   1190 data76,181,8,224,3,208,
     220,32,952
a8   1200 data198,9,13,13,80,82,7
     9,84,558
7a   1210 data69,67,84,69,68,32,7
     0,73,532
f0   1220 data76,69,13,0,32,198,9
     ,13,410
bb   1230 data13,79,82,73,71,73,7
     8,65,534
cc   1240 data76,32,83,84,65,82,8
     4,32,538
c4   1250 data65,68,68,82,69,83,8
     3,32,550
63   1260 data58,32,36,0,160,2,17
     7,178,643
b4   1270 data32,31,10,136,177,17
     8,32,31,627
16   1280 data10,32,198,9,13,13,3
     2,32,339
36   1290 data32,32,32,32,32,32,3
     2,69,293
54   1300 data78,68,32,32,32,65,6
     8,68,443
ab   1310 data82,69,83,83,32,58,3
     2,36,475
ba   1320 data0,160,4,177,178,32,
     31,10,592
7a   1330 data136,177,178,32,31,1
     0,56,32,652
96   1340 data125,245,8,32,198,9,
     13,13,643
9e   1350 data78,69,87,32,32,32,3
     2,32,394
11   1360 data32,83,84,65,82,84,3
     2,65,527
ab   1370 data68,68,82,69,83,83,3
     2,58,543
7d   1380 data32,36,0,173,109,9,3
     2,31,422
44   1390 data10,173,108,9,32,31,
     10,32,405
93   1400 data198,9,13,13,32,32,3
     2,32,361
e4   1410 data32,32,32,32,32,69,7
     8,68,375
1b   1420 data32,32,32,65,68,68,8
     2,69,448
c3   1430 data83,83,32,58,32,36,0
     ,165,489
23   1440 data175,32,31,10,165,17
     4,32,31,650
35   1450 data10,40,96,0,0,134,17
     4,132,586
94   1460 data175,170,181,0,133,1
     93,181,1,1034
3c   1470 data133,194,32,198,9,14
     7,13,84,810
ce   1480 data65,80,69,32,83,65,8
     6,73,553
c8   1490 data78,71,32,82,79,85,8
     4,73,584
f3   1500 data78,69,13,13,13,0,32
     ,206,424
31   1510 data12,32,208,247,32,56
     ,248,32,867
dd   1520 data143,246,165,185,32,
     106,247,176,1300
90   1530 data23,173,194,9,133,19
     3,173,195,1093
86   1540 data9,133,194,173,196,9
     ,133,174,1021
4b   1550 data173,197,9,133,175,3
     2,103,248,1070
b0   1560 data96,0,0,0,0,72,152,7
     2,392
cd   1570 data138,72,186,232,232,
     232,232,189,1513
60   1580 data0,1,133,251,189,1,1
     ,133,709
21   1590 data252,230,251,208,2,2
     30,252,160,1585
61   1600 data0,177,251,240,6,32,
     202,241,1149
4e   1610 data200,208,246,152,24,
     101,251,157,1339
86   1620 data0,1,169,0,101,252,1
     57,1,681
a9   1630 data1,104,170,104,168,1
     04,96,169,916
3e   1640 data54,133,1,169,128,13
     3,157,169,944
b2   1650 data0,141,32,208,141,33
     ,208,32,795
82   1660 data198,9,5,147,0,96,16
     9,55,679
53   1670 data133,1,32,24,229,96,
     72,74,661
81   1680 data74,74,74,32,60,10,1
     41,55,520
fa   1690 data10,104,72,41,15,32,
     60,10,344
2c   1700 data141,56,10,32,198,9,
     48,48,542
90   1710 data0,104,96,248,24,105
     ,144,105,826
35   1720 data64,216,96,169,0,133
     ,198,24,900
80   1730 data162,24,160,0,32,10,
     229,32,649
1b   1740 data198,9,32,32,32,32,3
     2,32,399
7e   1750 data80,82,69,83,83,32,8
     3,80,592
bc   1760 data65,67,69,32,66,65,8
     2,32,478
42   1770 data84,79,32,67,79,78,8
     4,73,576
cd   1780 data78,85,69,32,32,32,3
     2,32,392
52   1790 data32,0,32,62,241,201,
     32,208,808
f7   1800 data249,96,162,0,134,19
     8,32,87,958
11   1810 data241,157,0,2,232,224
     ,88,240,1184
fa   1820 data5,201,13,208,241,20
     2,142,160,1172
d6   1830 data10,32,198,9,13,0,96
     ,0,358
a1   1840 data173,160,10,201,4,24
     0,21,32,841
93   1850 data198,9,13,52,32,68,7
     3,71,516
e3   1860 data73,84,83,32,79,78,7
     6,89,594
0d   1870 data13,0,56,96,174,1,2,
     172,514
f1   1880 data0,2,32,214,10,133,2
     52,174,817
ba   1890 data3,2,172,2,2,32,214,
     10,437
91   1900 data170,164,252,24,96,1
     52,32,232,1122
fe   1910 data10,10,10,10,10,133,
     251,138,572
09   1920 data32,232,10,24,101,25
     1,96,56,802
8d   1930 data233,48,144,13,201,1
     0,144,8,801
8a   1940 data233,7,144,5,201,16,
     176,1,783
2c   1950 data96,32,198,9,13,73,7
     8,86,585
13   1960 data65,76,73,68,32,72,6
     9,88,543
90   1970 data32,68,73,71,73,84,1
     3,0,414
f3   1980 data104,104,104,104,56,
     96,32,198,798
73   1990 data9,70,73,76,69,78,65
     ,77,517
d5   2000 data69,32,58,0,32,131,1
     0,173,505
bc   2010 data160,10,240,26,201,1
     7,144,5,803
c3   2020 data169,16,141,160,10,1
     62,0,189,847
f8   2030 data0,2,157,79,11,232,2
     36,160,877
4c   2040 data10,208,244,173,160,
     10,162,79,1046
c2   2050 data160,11,32,249,253,9
     6,32,32,865
5a   2060 data32,32,32,32,32,32,3
     2,32,256
6a   2070 data32,32,32,32,32,32,3
     2,198,422
80   2080 data9,147,13,82,69,76,7
     9,67,542
a6   2090 data65,84,65,66,76,69,3
     2,76,533
e4   2100 data79,65,68,13,13,13,0
```

```
    ,169,420
eb  2110 data55,133,1,32,23,11,3
    2,198,485
42  2120 data9,13,13,78,69,87,32
    ,83,384
bf  2130 data84,65,82,84,32,65,6
    8,68,548
36  2140 data82,69,83,83,32,58,3
    2,36,475
46  2150 data0,32,131,10,32,161,
    10,176,552
5f  2160 data221,192,16,144,6,20
    8,35,224,1046
37  2170 data108,176,31,32,198,9
    ,13,13,580
eb  2180 data77,69,77,79,82,89,3
    2,67,572
f5  2190 data79,78,70,76,73,67,8
    4,32,559
24  2200 data69,82,82,79,82,13,0
    ,76,483
46  2210 data127,11,165,186,201,
    8,240,6,944
44  2220 data32,23,8,76,218,11,3
    2,191,591
04  2230 data14,144,16,32,198,9,
    13,13,439
6a  2240 data76,79,65,68,32,69,8
    2,82,553
ca  2250 data79,82,0,32,68,10,96
    ,32,399
34  2260 data198,9,147,13,82,69,
    76,79,673
c8  2270 data67,65,84,65,66,76,6
    9,32,524
1d  2280 data83,65,86,69,13,13,1
    3,0,342
ba  2290 data32,23,11,32,198,9,1
    3,13,331
0d  2300 data83,65,86,69,32,70,8
    2,79,566
a4  2310 data77,32,58,32,36,0,32
    ,131,398
61  2320 data10,32,161,10,176,22
    9,142,194,954
0b  2330 data9,140,195,9,32,198,
    9,13,605
0d  2340 data13,32,32,32,32,32,3
    2,32,237
40  2350 data84,79,32,58,32,36,0
    ,32,353
2c  2360 data131,10,32,161,10,17
    6,229,142,891
ac  2370 data196,9,140,197,9,32,
    198,9,790
cf  2380 data13,13,78,69,87,32,8
    3,84,459
8c  2390 data65,82,84,32,65,68,6
    8,82,546
9a  2400 data69,83,83,32,58,32,3
    6,0,393
71  2410 data32,131,10,32,161,10
    ,176,221,773
68  2420 data134,193,132,194,173
    ,196,9,56,1087
77  2430 data237,194,9,133,174,1
    73,197,9,1126
d6  2440 data237,195,9,176,38,32
    ,198,9,894
9a  2450 data13,13,83,84,65,82,8
    4,32,456
d3  2460 data65,68,68,82,69,83,8
    3,32,550
7c  2470 data62,32,69,78,68,32,6
    5,68,474
5f  2480 data68,82,69,83,83,13,1
    3,0,411
f1  2490 data76,12,12,133,175,24
    ,138,101,671
1a  2500 data174,170,152,101,175
    ,168,165,186,1291
c1  2510 data201,8,240,8,169,193
    ,32,110,961
af  2520 data9,76,202,12,169,193
    ,32,1,694
53  2530 data16,32,68,10,96,32,1
    98,9,461
4f  2540 data83,65,86,73,78,71,3
    2,70,558
3c  2550 data82,79,77,32,58,32,3
    6,0,396
31  2560 data173,195,9,32,31,10,
    173,194,817
1c  2570 data9,32,31,10,32,198,9
    ,13,334
34  2580 data13,32,32,32,32,32,3
    2,32,237
c3  2590 data32,32,84,79,32,58,3
    2,36,385
56  2600 data0,173,197,9,32,31,1
    0,173,625
07  2610 data196,9,32,31,10,32,1
    98,9,517
d3  2620 data13,13,13,84,79,32,8
    2,69,385
50  2630 data76,79,65,68,32,70,8
    2,79,551
49  2640 data77,32,58,32,36,0,16
    5,194,594
4d  2650 data32,31,10,165,193,32
    ,31,10,504
b8  2660 data32,198,9,13,13,32,3
    2,32,361
36  2670 data32,32,32,32,32,32,3
    2,32,256
ab  2680 data32,84,79,32,58,32,3
    6,0,353
ee  2690 data165,175,32,31,10,16
    5,174,32,784
45  2700 data31,10,32,198,9,13,1
    3,13,319
7e  2710 data0,96,32,198,9,147,5
    ,13,500
e0  2720 data13,32,32,32,32,32,3
    2,32,237
ca  2730 data32,32,32,32,32,32,7
    7,32,301
99  2740 data69,32,78,32,85,13,1
    3,13,335
6f  2750 data13,13,158,32,32,32,
    32,32,344
0b  2760 data32,32,32,32,32,40,4
    9,41,290
35  2770 data32,84,65,80,69,32,7
    6,79,517
78  2780 data65,68,13,13,153,32,
    32,32,408
fa  2790 data32,32,32,32,32,32,3
    2,40,264
af  2800 data50,41,32,84,65,80,6
    9,32,453
f6  2810 data83,65,86,69,32,40,8
    0,82,537
48  2820 data79,84,69,67,84,69,6
    8,41,561
9b  2830 data13,13,150,32,32,32,
    32,32,336
65  2840 data32,32,32,32,32,40,5
    1,41,292
ac  2850 data32,84,65,80,69,32,8
    3,65,510
50  2860 data86,69,32,40,85,78,8
    0,82,552
c2  2870 data79,84,69,67,84,69,6
    8,41,561
fb  2880 data13,13,154,0,32,198,
    9,32,451
b3  2890 data32,32,32,32,32,32,3
    2,32,256
42  2900 data32,40,52,41,32,68,7
    3,83,421
a8  2910 data75,32,76,79,65,68,1
    3,13,421
7c  2920 data129,32,32,32,32,32,
    32,32,353
d1  2930 data32,32,32,40,53,41,3
    2,68,330
d6  2940 data73,83,75,32,83,65,8
    6,69,566
e8  2950 data13,13,159,32,32,32,
    32,32,345
99  2960 data32,32,32,32,32,40,5
    4,41,295
e5  2970 data32,81,85,73,84,13,1
    3,13,394
77  2980 data13,13,5,32,32,32,32
    ,32,191
f1  2990 data32,32,32,32,32,67,7
    2,79,378
14  3000 data79,83,69,32,79,80,8
    4,73,579
98  3010 data79,78,0,169,0,133,1
    98,32,689
2d  3020 data62,241,201,49,208,1
    5,169,1,946
e4  3030 data133,186,32,198,9,15
    8,0,32,748
cb  3040 data95,11,76,91,13,201,
    50,208,745
cd  3050 data19,169,1,133,186,16
    9,3,133,813
21  3060 data185,32,198,9,153,0,
    32,240,849
fb  3070 data11,76,91,13,201,51,
    208,19,670
4f  3080 data169,1,133,186,169,1
    ,133,185,977
79  3090 data32,198,9,150,0,32,2
    40,11,672
37  3100 data76,91,13,201,52,208
    ,15,169,825
1a  3110 data8,133,186,32,198,9,
    154,0,720
86  3120 data32,95,11,76,91,13,2
    01,53,572
62  3130 data208,15,169,8,133,18
    6,32,198,949
27  3140 data9,129,0,32,240,11,7
    6,91,588
1b  3150 data13,201,54,208,146,9
    6,32,198,948
f7  3160 data9,147,13,68,73,83,7
    5,32,500
30  3170 data76,79,65,68,73,78,7
    1,32,542
2c  3180 data82,79,85,84,73,78,6
    9,13,563
6f  3190 data13,13,0,134,195,132
    ,196,169,852
04  3200 data0,133,147,133,144,1
    65,183,208,1113
8f  3210 data25,32,198,9,13,13,7
    0,73,433
eb  3220 data76,69,78,65,77,69,3
    2,77,543
ad  3230 data73,83,83,73,78,71,1
    3,0,474
f3  3240 data56,96,32,175,245,16
    9,96,133,1002
c4  3250 data185,32,213,243,165,
    186,32,9,1065
ce  3260 data237,165,185,32,199,
    237,32,19,1106
3d  3270 data238,141,194,9,165,1
    44,74,74,1039
81  3280 data144,23,32,198,9,13,
    13,70,502
e2  3290 data73,76,69,32,78,79,8
    4,32,523
a4  3300 data70,79,85,78,68,13,0
    ,56,449
9a  3310 data96,32,19,238,141,19
    5,9,32,762
36  3320 data232,244,32,198,9,13
    ,13,79,820
6a  3330 data82,73,71,73,78,65,7
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    6,32,550
02  3340 data83,84,65,82,84,32,6
    5,68,563
68  3350 data68,82,69,83,83,32,5
    8,32,507
fe  3360 data36,0,173,195,9,32,3
    1,10,486
3b  3370 data173,194,9,32,31,10,
    32,198,679
09  3380 data9,13,13,32,32,32,32
    ,32,195
42  3390 data32,32,32,32,69,78,6
    8,32,375
87  3400 data32,32,65,68,68,82,6
    9,83,499
64  3410 data83,32,58,32,36,0,56
    ,165,462
38  3420 data174,229,195,170,165
    ,175,229,196,1533
b7  3430 data168,24,138,109,194,
    9,72,152,866
73  3440 data109,195,9,32,31,10,
    104,32,522
04  3450 data31,10,32,198,9,13,1
    3,13,319
0c  3460 data78,69,87,32,32,32,3
    2,32,394
4b  3470 data32,83,84,65,82,84,3
    2,65,527
d9  3480 data68,68,82,69,83,83,3
    2,58,543
ed  3490 data32,36,0,165,196,32,
    31,10,502
52  3500 data165,195,32,31,10,32
    ,198,9,672
dd  3510 data13,13,32,32,32,32,3
    2,32,218
fc  3520 data32,32,32,69,78,68,3
    2,32,375
d3  3530 data32,65,68,68,82,69,8
    3,83,550
ce  3540 data32,58,32,36,0,165,1
    75,32,530
a8  3550 data31,10,165,174,32,31
    ,10,96,549
f4  3560 data32,198,9,147,13,68,
    73,83,623
5e  3570 data75,32,83,65,86,73,7
    8,71,563
69  3580 data32,82,79,85,84,73,7
    8,69,582
c9  3590 data13,13,13,0,134,174,
    132,175,654
d1  3600 data170,181,0,133,193,1
    81,1,133,992
06  3610 data194,165,183,208,3,7
    6,234,14,1077
99  3620 data169,97,133,185,32,2
    06,12,32,866
dc  3630 data213,243,32,143,246,
    165,186,32,1260
59  3640 data12,237,165,185,32,1
    85,237,165,1218
fd  3650 data193,32,221,237,165,
    194,32,221,1295
bb  3660 data237,173,194,9,133,1
    72,173,195,1286
ac  3670 data9,133,173,173,196,9
    ,133,174,1000
20  3680 data173,197,9,133,175,1
    60,0,32,879
09  3690 data36,246,96,-1
```

PROGRAM: AIRCRAFT DATA

```
AF  10 REM**********************
    *
4B  20 REM*   SPRITE LIRBARY
    *
A3  30 REM*   --------------
    *
C1  40 REM*  AIRCRAFT SPRITES
    *
CE  50 REM*  BASIC DATA LOADER
    *
99  60 REM* SPRITES DESIGNED BY
    *
2E  70 REM*     MIKE BENN
    *
C5  80 REM**********************
    *
DD  90 BL=255   :LN=190   :SA=1024
    0
89  100 FOR L=0 TO BL:CX=0:FOR D
    =0 TO 15
4F  110 READ A:IF A>255THENPRINT
    "NUMBER TO LARGE":LN+(L*10):
    STOP
98  120 CX=CX+A:POKE SA+L*16+D,A
    :NEXT D
D9  130 READ A:IF A><CX THENPRIN
    T"ERROR IN LINE":LN+(L*10):S
    TOP
37  140 NEXTL:POKE43,0:POKE44,40
    :POKE45,0:POKE46,56
69  150 SAVE"AIRCRAFT",8,1:END
EF  160 REM*********************
    ***********
3B  170 REM TAPE USERS WILL NEED
     TO CHANGE          DEVICE N
    UMBER FROM 8 TO 1
FB  180 REM*********************
    ***********
2D  190 DATA 0,0,0,0,0,0,0,0,0,0
    ,0,0,0,0,0,0,0
1B  200 DATA 0,0,0,0,0,0,0,0,0,0
    ,0,0,0,0,0,0,0
01  210 DATA 0,0,0,0,0,0,0,0,0,1
    ,0,0,0,0,0,0,1
0F  220 DATA 0,0,0,0,0,0,0,0,0,0
    ,0,0,0,0,0,2,2
75  230 DATA 0,0,0,0,0,0,0,0,0,0
    ,0,0,0,0,0,0,0
63  240 DATA 0,0,0,0,0,0,0,0,0,0
    ,0,0,0,0,0,0,0
69  250 DATA 0,0,0,0,0,0,0,0,0,0
    ,0,0,0,0,0,0,0
DE  260 DATA 0,0,0,0,0,0,0,0,0,0
    ,0,0,0,0,0,251,251
5C  270 DATA 0,0,0,0,0,0,0,0,0,0
    ,0,0,0,0,0,0,0
4A  280 DATA 0,0,0,0,0,0,0,0,0,0
    ,0,0,0,0,0,0,0
5E  290 DATA 0,0,0,0,0,0,1,0,0,1
    ,0,0,7,0,0,0,9
06  300 DATA 0,0,0,0,0,0,0,0,0,0
    ,0,0,0,0,0,255,255
A4  310 DATA 0,0,0,0,0,0,0,0,0,0
    ,0,0,0,0,0,0,0
92  320 DATA 0,0,0,0,0,0,0,0,0,0
    ,0,0,0,0,0,0,0
C8  330 DATA 0,0,0,0,0,0,0,0,0,0
    ,192,0,0,0,0,0,192
8B  340 DATA 0,0,0,0,0,0,0,0,0,0
    ,0,0,0,0,0,254,254
8C  350 DATA 0,0,0,0,0,0,0,0,0,0
    ,0,0,0,0,0,0,0
FA  360 DATA 0,0,0,0,0,0,0,0,0,0
    ,0,0,0,0,0,0,0
D0  370 DATA 0,0,0,0,0,0,1,0,0,3
    ,0,0,31,0,0,0,35
EE  380 DATA 0,0,0,0,0,0,0,0,0,0
    ,0,0,0,0,0,0,0
D4  390 DATA 0,0,0,0,0,0,0,0,0,0
    ,0,0,0,0,0,0,0
C2  400 DATA 0,0,0,0,0,0,0,0,0,0
    ,0,0,0,0,0,0,0
04  410 DATA 0,0,0,0,0,0,0,128,0
    ,0,240,0,0,0,0,0,368
BE  420 DATA 0,0,0,0,0,0,0,0,0,0
    ,0,0,0,0,0,255,255
3C  430 DATA 0,0,0,0,0,0,0,0,0,0
    ,0,0,0,0,0,0,0
2A  440 DATA 0,0,0,0,0,0,0,0,0,0
    ,0,0,0,0,0,0,0
5F  450 DATA 0,0,0,1,0,0,3,0,0,7
    ,0,0,255,0,0,0,266
1E  460 DATA 0,0,0,0,0,0,0,0,0,0
    ,0,0,0,0,0,2,2
04  470 DATA 0,0,0,0,0,0,0,0,0,0
    ,0,0,0,0,0,0,0
72  480 DATA 0,0,0,0,0,0,0,0,0,0
    ,0,0,0,0,0,0,0
A2  490 DATA 0,0,0,0,128,0,0,192
    ,0,0,255,0,0,0,0,0,575
6E  500 DATA 0,0,0,0,0,0,0,0,0,0
    ,0,0,0,0,0,4,4
6C  510 DATA 0,0,0,0,0,0,0,0,0,0
    ,0,0,0,0,0,0,0
59  520 DATA 0,0,0,0,0,0,0,0,0,0
    ,0,0,0,1,0,0,1
76  530 DATA 3,0,0,5,0,0,15,0,0,
    7,0,31,255,0,0,195,511
39  540 DATA 0,0,0,0,0,0,0,0,0,0
    ,0,0,0,0,0,253,253
BB  550 DATA 0,0,0,0,0,0,0,0,0,0
    ,0,0,0,0,0,0,0
35  560 DATA 0,0,0,0,0,0,0,0,0,0
    ,0,0,0,0,128,0,128
40  570 DATA 0,64,0,0,192,0,0,22
    4,0,0,255,240,0,131,0,0,1106

9D  580 DATA 0,0,0,0,0,0,0,0,0,0
    ,0,0,0,0,0,5,5
83  590 DATA 0,0,0,0,0,0,0,0,0,0
    ,0,0,0,0,0,0,0
8B  600 DATA 0,0,0,0,0,0,0,0,0,0
    ,1,0,0,1,0,0,2
AD  610 DATA 7,0,0,9,0,0,57,0,0,
    7,0,6,7,7,255,255,610
0A  620 DATA 0,6,3,0,0,0,0,0,0,0
    ,0,0,0,0,0,255,264
EB  630 DATA 0,0,0,0,0,0,0,0,0,0
    ,0,0,0,0,0,0,0
61  640 DATA 0,0,0,0,0,0,0,0,0,0
    ,0,0,0,0,192,0,192
A0  650 DATA 0,32,0,0,56,0,0,224
    ,0,0,225,128,0,255,255,192,1
    367
38  660 DATA 129,128,0,0,0,0,0,0
    ,0,0,0,0,0,0,0,1,258
33  670 DATA 0,0,0,0,0,0,0,0,0,0
    ,0,0,0,0,0,0,0
3D  680 DATA 0,0,0,0,1,0,0,1,0,0
    ,1,0,0,1,0,0,4
7A  690 DATA 15,0,0,17,0,0,249,0
    ,0,15,0,28,15,31,247,255,872

8C  700 DATA 0,28,3,0,0,0,0,0,0,
    0,0,0,0,0,0,2,33
1B  710 DATA 0,0,0,0,0,0,0,0,0,0
    ,0,0,0,0,0,0,0
01  720 DATA 0,0,0,0,0,0,0,0,0,0
    ,0,0,0,0,224,0,224
E3  730 DATA 0,16,0,0,62,0,0,224
    ,0,0,224,224,0,255,191,240,1
    436
01  740 DATA 128,224,0,0,0,0,0,0
    ,0,0,0,0,0,0,0,251,603
63  750 DATA 0,0,0,0,0,0,0,0,0,0
    ,0,0,0,0,0,0,0
61  760 DATA 0,1,0,0,1,0,0,1,0,0
    ,3,0,0,3,0,0,9
59  770 DATA 31,0,0,56,0,0,254,1
    5,7,31,0,253,143,0,7,127,924

AA  780 DATA 0,0,3,0,0,0,0,0,0,0
    ,0,0,0,0,0,255,258
3E  790 DATA 0,0,0,0,0,0,0,0,0,0
    ,0,0,0,0,0,128,128
5C  800 DATA 0,0,128,0,0,0,0,0,0
    ,0,0,0,0,0,240,0,368
BF  810 DATA 0,72,0,0,88,0,0,240
    ,0,0,240,0,0,255,224,0,1119
B2  820 DATA 192,190,0,0,224,0,0
```

```
    ,0,0,0,0,0,0,0,0,1,607
92  830 DATA 0,0,0,0,0,0,0,0,0,0
    ,0,0,0,0,0,0,0,0
E2  840 DATA 0,16,0,0,24,0,0,24,
    0,0,28,0,0,28,0,0,120
ED  850 DATA 255,0,1,248,0,0,124
    ,1,192,127,0,63,255,0,1,255,
    1522
FE  860 DATA 0,0,195,0,0,0,0,0,0
    ,0,0,0,0,0,0,2,197
FA  870 DATA 0,0,0,0,0,0,0,0,0,0
    ,0,0,0,0,0,0,0
68  880 DATA 0,0,0,0,0,0,0,0,0,0
    ,0,0,0,0,240,0,240
B6  890 DATA 0,72,0,0,92,0,0,252
    ,0,0,254,0,0,254,0,0,924
E7  900 DATA 231,224,0,0,0,0,0,0
    ,0,0,0,0,0,0,0,0,251,706
C2  910 DATA 0,0,0,0,0,0,0,0,0,0
    ,0,0,0,0,0,0,0,0
F8  920 DATA 2,0,0,3,0,0,3,0,0,3
    ,0,0,3,0,0,7,21
1E  930 DATA 255,0,7,234,0,3,255
    ,0,3,255,0,1,255,0,63,255,15
    86
E2  940 DATA 0,3,152,0,0,0,0,0,0
    ,0,0,0,0,0,0,255,410
2A  950 DATA 0,0,0,0,0,0,0,0,0,0
    ,0,0,0,0,0,0,0,0
78  960 DATA 0,0,0,0,0,0,0,0,0,0
    ,0,0,0,0,248,0,248
A4  970 DATA 0,112,0,0,100,0,0,2
    54,0,0,255,0,0,255,0,0,976
92  980 DATA 255,224,0,1,128,0,0
    ,0,0,0,0,0,0,0,0,0,1,609
72  990 DATA 0,0,0,0,0,0,0,0,0,0
    ,0,0,0,0,0,0,0,0
FD  1000 DATA 16,0,0,24,0,0,24,0
    ,0,24,0,0,24,0,0,31,143
25  1010 DATA 255,0,63,250,0,7,2
    50,0,1,255,0,0,63,0,0,127,12
    71
68  1020 DATA 0,0,3,0,0,0,0,0,0,
    0,0,0,0,0,0,0,2,5
59  1030 DATA 0,0,0,0,0,0,0,0,0,
    0,0,0,0,0,0,0,0,0
B2  1040 DATA 0,0,0,0,0,0,0,0,0,
    0,0,0,0,0,255,192,447
AF  1050 DATA 0,173,0,0,173,160,
    0,255,248,0,255,252,0,255,25
    2,0,2023
BF  1060 DATA 255,224,0,0,0,0,0,
    0,0,0,0,0,0,0,0,0,251,730
A1  1070 DATA 0,0,0,0,0,0,0,0,0,
    0,0,0,0,0,0,0,0,0
30  1080 DATA 64,0,0,96,0,0,96,0
    ,0,112,0,0,120,0,0,127,615
72  1090 DATA 255,0,255,253,0,31
    ,253,0,7,255,0,0,63,0,0,7,13
    79
8B  1100 DATA 0,0,0,0,0,0,0,0,0,
    0,0,0,0,0,0,255,255
89  1110 DATA 0,0,0,0,0,0,0,0,0,
    0,0,0,0,0,0,0,0,0
8F  1120 DATA 0,0,0,0,0,0,0,0,0,
    0,0,0,0,0,255,248,503
C4  1130 DATA 0,182,128,0,182,19
    6,0,255,255,128,255,255,224,
    255,255,192,2762
A5  1140 DATA 255,248,0,0,0,0,0,
    0,0,0,0,0,0,0,0,0,1,504
D7  1150 DATA 0,0,3,0,0,1,0,0,0,
    0,0,0,0,0,0,0,0,4
DF  1160 DATA 0,0,0,0,0,0,0,0,0,
    0,0,0,0,0,0,0,0,0
C5  1170 DATA 0,0,0,0,0,0,0,0,0,
    0,0,0,0,0,0,0,0,0
CB  1180 DATA 0,0,0,0,0,0,0,0,0,
    0,0,0,0,0,0,0,4,4
BD  1190 DATA 128,0,0,0,0,0,0,0,
    0,0,0,0,0,0,0,0,0,128
27  1200 DATA 0,0,0,0,0,0,0,0,0,
    0,0,0,0,0,0,0,0,0
2D  1210 DATA 0,0,0,0,0,0,0,0,0,
    0,0,0,0,0,0,0,0,0
67  1220 DATA 0,0,0,0,0,0,0,0,0,
    0,0,0,0,0,0,253,253
76  1230 DATA 0,0,0,0,0,0,0,0,7,
    0,0,1,0,0,3,0,11
64  1240 DATA 0,3,0,0,3,0,0,5,0,
    0,0,0,0,0,0,0,0,11
75  1250 DATA 0,0,0,0,0,0,0,0,0,
    0,0,0,0,0,0,0,0,0
EB  1260 DATA 0,0,0,0,0,0,0,0,0,
    0,0,0,0,0,0,251,251
AF  1270 DATA 0,0,0,0,0,0,192,0,
    0,0,0,0,128,0,0,128,448
4F  1280 DATA 0,0,128,0,0,64,0,0
    ,0,0,0,0,0,0,0,0,0,192
5C  1290 DATA 0,0,0,0,0,0,0,0,0,
    0,0,0,0,0,0,0,0,0
BC  1300 DATA 0,0,0,0,0,0,0,0,0,
    0,0,0,0,0,0,92,92
A2  1310 DATA 0,0,0,0,0,0,0,0,0,
    0,0,0,0,1,255,0,256
A3  1320 DATA 0,1,0,0,3,0,0,4,0,
    0,4,0,0,6,0,0,18
99  1330 DATA 7,0,0,3,0,0,5,0,0,
    0,0,0,0,0,0,0,0,15
8C  1340 DATA 0,0,0,0,0,0,0,0,0,
    0,0,0,0,0,0,90,90
38  1350 DATA 0,0,0,0,0,0,0,0,0,
    0,0,0,255,0,0,0,255
FF  1360 DATA 0,0,128,0,0,64,0,0
    ,64,0,0,192,0,0,192,0,640
31  1370 DATA 0,128,0,0,64,0,0,0
    ,0,0,0,0,0,0,0,0,0,192
2C  1380 DATA 0,0,0,0,0,0,0,0,0,
    0,0,0,0,0,0,93,93
91  1390 DATA 0,0,0,0,0,0,0,0,0,
    0,0,1,0,63,255,0,319
87  1400 DATA 0,1,0,0,7,0,0,7,0,
    0,9,0,0,9,0,0,33
BA  1410 DATA 9,0,0,9,0,0,9,0,0,
    15,0,0,11,0,0,7,60
BC  1420 DATA 0,0,11,0,0,8,0,0,1
    6,0,0,0,0,0,0,91,126
2D  1430 DATA 0,0,0,0,0,0,0,0,0,
    0,0,0,255,252,0,0,507
E1  1440 DATA 0,0,192,0,0,192,0,
    0,128,0,0,32,0,0,32,0,576
31  1450 DATA 0,32,0,0,32,0,0,22
    4,0,0,160,0,0,192,0,0,640
EA  1460 DATA 160,0,0,32,0,0,16,
    0,0,0,0,0,0,0,0,0,3,211
02  1470 DATA 0,0,0,0,0,1,15,255
    ,255,0,0,1,0,0,1,0,528
4A  1480 DATA 0,7,0,0,3,0,0,7,0,
    0,15,0,0,17,0,0,49
8C  1490 DATA 17,0,0,17,0,0,25,0
    ,0,31,0,0,19,0,0,19,128
68  1500 DATA 0,0,11,0,0,15,0,0,
    16,0,0,32,0,0,64,0,138
25  1510 DATA 0,0,0,0,0,0,255,25
    5,224,0,0,0,0,0,0,192,926
83  1520 DATA 0,0,128,0,0,192,0,
    0,224,0,0,16,0,0,16,0,576
27  1530 DATA 0,16,0,0,48,0,0,24
    0,0,0,144,0,0,144,0,0,592
D2  1540 DATA 160,0,0,224,0,0,32
    ,0,0,16,0,0,8,0,0,2,442
7B  1550 DATA 0,0,0,0,0,1,0,1,25
    5,0,0,1,0,0,1,0,259
E7  1560 DATA 0,7,0,0,3,0,0,7,0,
    0,15,0,0,17,0,0,49
73  1570 DATA 17,0,0,17,0,0,25,0
    ,0,31,0,0,19,0,0,19,128
DC  1580 DATA 0,0,11,0,0,15,0,0,
    16,0,0,32,0,0,64,91,229
AC  1590 DATA 0,0,0,0,0,0,254,0,
    0,0,0,0,0,0,0,192,446
82  1600 DATA 0,0,128,0,0,192,0,
    0,224,0,0,16,0,0,16,0,576
A2  1610 DATA 0,16,0,0,48,0,0,24
    0,0,0,144,0,0,144,0,0,592
E2  1620 DATA 160,0,0,224,0,0,32
    ,0,0,16,0,0,8,0,0,3,443
61  1630 DATA 0,0,0,0,0,1,15,255
    ,255,0,0,1,0,0,1,0,528
49  1640 DATA 0,7,0,0,67,0,0,127
    ,0,0,127,0,0,57,0,0,385
C2  1650 DATA 57,0,0,56,0,0,24,0
    ,0,31,0,0,30,0,0,30,228
65  1660 DATA 0,0,15,0,0,7,0,0,2
    0,0,0,12,0,0,6,2,62
C4  1670 DATA 0,0,0,0,0,0,255,25
    5,224,0,0,0,0,0,0,192,926
32  1680 DATA 0,0,128,0,0,192,0,
    0,224,0,0,16,0,0,16,0,576
77  1690 DATA 0,144,0,0,176,0,0,
    240,0,0,80,0,0,80,0,0,720
AC  1700 DATA 224,0,0,240,0,0,8,
    0,0,12,0,0,4,0,0,254,742
71  1710 DATA 0,0,0,0,0,1,15,255
    ,255,0,0,1,0,0,1,0,528
7C  1720 DATA 4,7,0,7,195,0,7,25
    5,0,5,255,0,0,246,0,0,981
0C  1730 DATA 244,0,0,116,0,0,12
    4,0,0,63,0,0,62,0,0,30,639
38  1740 DATA 0,0,31,0,0,103,0,0
    ,25,0,0,7,0,0,0,89,255
94  1750 DATA 0,0,0,0,0,0,255,25
    5,224,0,0,0,0,0,0,192,926
D9  1760 DATA 0,0,128,0,0,192,0,
    0,192,0,0,224,0,0,80,0,816
2C  1770 DATA 0,40,0,0,24,0,0,25
    2,0,0,60,0,0,124,0,0,500
86  1780 DATA 248,0,0,240,0,0,8,
    0,0,4,0,0,0,0,0,255,755
39  1790 DATA 0,0,0,0,0,0,3,255,
    255,0,0,0,0,0,0,0,513
C6  1800 DATA 128,7,1,255,131,1,
    255,255,0,131,255,0,1,252,0,
    0,1672
1F  1810 DATA 252,0,0,124,0,0,62
    ,0,0,31,0,0,15,0,0,7,491
EF  1820 DATA 0,0,23,0,0,25,0,0,
    6,0,0,1,0,0,0,89,144
A2  1830 DATA 0,0,0,32,0,0,255,2
    55,252,32,0,0,32,0,0,252,111
    0
14  1840 DATA 0,0,248,0,0,252,0,
    0,254,0,0,66,0,0,65,0,885
47  1850 DATA 0,64,128,0,65,128,
    0,255,192,0,240,224,0,241,22
    4,0,1761
B7  1860 DATA 255,192,0,254,0,0,
    40,0,0,231,0,0,0,0,0,255,122
    7
4E  1870 DATA 0,0,0,0,0,0,3,255,
    255,0,0,0,0,0,0,32,545
D5  1880 DATA 0,7,255,255,131,12
    7,255,255,64,127,255,0,15,25
    2,0,3,2001
DE  1890 DATA 252,0,1,252,0,0,25
    4,0,0,127,0,0,63,0,0,15,964
DF  1900 DATA 0,0,7,0,0,3,0,0,2,
    0,0,2,0,0,63,2,79
90  1910 DATA 32,0,0,48,0,0,255,
    255,255,48,0,0,48,0,0,255,11
    96
79  1920 DATA 0,0,254,0,0,255,12
    8,0,255,192,0,48,160,0,48,14
    4,1484
FD  1930 DATA 0,48,72,0,48,68,0,
    255,254,0,255,195,128,255,19
    9,0,1777
87  1940 DATA 255,222,0,255,248,
    0,2,0,0,2,96,0,255,128,0,254
    ,1717
0F  1950 DATA 0,0,0,0,0,0,0,0,25
    5,0,0,0,0,0,0,128,383
8A  1960 DATA 0,7,255,255,131,12
    7,255,255,32,127,255,0,15,25
    2,0,3,1969
AE  1970 DATA 252,0,1,252,0,0,25
```

```
     4,0,0,127,0,0,63,0,0,15,964
E3   1980 DATA 0,0,7,0,0,3,0,0,2,
     0,0,2,0,0,63,0,77
3A   1990 DATA 32,0,0,48,0,0,255,
     252,0,48,0,0,48,0,0,255,938
E9   2000 DATA 0,0,254,0,0,255,12
     8,0,255,192,0,48,160,0,48,14
     4,1484
6D   2010 DATA 0,48,72,0,48,68,0,
     255,254,0,255,195,128,255,19
     9,0,1777
F4   2020 DATA 255,222,0,255,248,
     0,2,0,0,2,96,0,255,128,0,1,1
     464
64   2030 DATA 0,0,0,0,0,0,0,0,1,
     0,0,1,0,0,1,0,3
72   2040 DATA 0,1,0,3,225,0,15,2
     55,0,63,255,0,255,255,3,255,
     1585
1A   2050 DATA 255,0,0,31,0,0,5,0
     ,0,9,0,0,11,0,0,15,326
A3   2060 DATA 0,0,3,0,0,0,0,0,0,
     0,0,0,0,0,0,91,94
4D   2070 DATA 0,0,0,0,0,0,0,0,0,
     0,0,0,0,0,0,0,0,0
94   2080 DATA 0,0,15,128,0,255,2
     24,0,255,248,0,255,254,0,255
     ,255,2144
9C   2090 DATA 128,240,0,0,64,0,0
     ,160,0,0,160,0,0,224,0,0,976

FA   2100 DATA 192,0,0,0,0,0,0,0,
     0,0,0,0,0,0,0,91,283
97   2110 DATA 0,0,0,0,0,0,0,0,1,
     0,0,1,0,0,1,0,3
61   2120 DATA 15,225,0,63,255,0,
     127,255,0,127,255,1,255,255,
     3,255,2091
27   2130 DATA 255,0,0,1,0,0,3,0,
     0,3,0,0,31,0,0,15,308
1B   2140 DATA 0,0,7,0,0,0,0,0,0,
     0,0,0,0,0,0,2,9
FD   2150 DATA 0,0,0,0,0,0,0,0,0,
     0,0,0,0,0,0,0,0,0
0B   2160 DATA 0,0,15,224,0,127,2
     48,0,255,254,0,255,240,0,255
     ,0,1873
D1   2170 DATA 0,240,0,0,224,0,0,
     0,0,0,224,0,0,224,0,0,912
45   2180 DATA 224,0,0,224,0,0,0,
     0,0,0,0,0,0,0,0,164,612
C7   2190 DATA 0,0,0,0,0,0,0,0,1,
     0,0,1,0,0,1,0,3
B4   2200 DATA 0,1,1,255,255,0,25
     5,255,0,127,255,0,63,255,0,6
     3,1785
77   2210 DATA 255,0,31,255,0,15,
     252,0,0,0,0,0,0,0,0,15,823
47   2220 DATA 0,0,7,0,0,0,0,0,0,
     0,0,0,0,0,0,0,7
2D   2230 DATA 0,0,0,0,0,0,0,0,0,
     0,0,0,0,0,0,0,0,0
5B   2240 DATA 0,0,255,254,0,255,
     254,0,255,254,0,255,248,0,25
     5,128,2413
CB   2250 DATA 0,240,0,0,112,0,0,
     52,0,0,124,0,0,248,0,0,776
42   2260 DATA 248,0,0,56,0,0,0,0
     ,0,0,0,0,0,0,0,89,393
77   2270 DATA 0,0,0,0,0,0,0,0,1,
     0,0,1,0,0,1,0,3
43   2280 DATA 0,1,255,255,255,12
     7,255,255,31,255,255,15,255,
     255,15,255,2739
05   2290 DATA 255,7,255,255,7,25
     5,252,7,254,0,0,0,0,0,63,1
     610
73   2300 DATA 0,0,63,0,0,32,0,0,
     0,0,0,0,0,0,0,89,184
5C   2310 DATA 0,0,0,0,0,0,0,0,0,
     0,0,0,0,0,0,0,0,0
BC   2320 DATA 0,0,255,255,254,25
     5,255,248,255,255,0,255,248,
     0,255,128,2918
71   2330 DATA 0,240,0,0,64,0,0,3
     5,0,0,127,0,0,252,0,0,718
B1   2340 DATA 248,0,0,8,0,0,0,0,
     0,0,0,0,0,0,0,165,421
A0   2350 DATA 0,0,0,0,0,0,0,0,2,
     0,0,2,0,0,2,0,6
5B   2360 DATA 0,1,0,0,1,0,0,15,0
     ,0,255,0,15,255,0,127,669
57   2370 DATA 255,3,255,255,63,2
     55,254,63,255,248,31,255,240
     ,3,255,255,2945
5B   2380 DATA 0,254,63,0,0,32,0,
     0,0,0,0,0,0,0,0,89,438
1A   2390 DATA 0,0,0,0,0,0,0,0,25
     4,0,15,248,1,255,192,31,996
60   2400 DATA 254,0,255,248,0,25
     5,192,0,255,0,0,240,0,0,224,
     0,1923
40   2410 DATA 0,224,0,0,19,0,0,1
     5,0,0,124,0,0,248,0,0,630
8A   2420 DATA 136,0,0,0,0,0,0,0,
     0,0,0,0,0,0,0,252,388
DE   2430 DATA 0,0,2,0,0,2,0,0,2,
     0,0,1,0,0,1,0,8
BC   2440 DATA 0,15,0,0,255,0,15,
     255,0,127,255,3,255,255,63,2
     55,1753
C7   2450 DATA 254,63,255,248,31,
     255,240,3,255,241,0,254,1,0,
     0,1,2101
9A   2460 DATA 0,0,1,0,0,3,0,0,1,
     0,0,0,0,0,0,95,100
01   2470 DATA 0,0,254,0,15,248,1
     ,255,192,31,254,0,255,248,0,
     255,2008
25   2480 DATA 192,0,255,0,0,240,
     0,0,224,0,0,224,0,0,19,0,115
     4
B4   2490 DATA 0,15,0,0,124,0,0,2
     48,0,0,200,0,0,192,0,0,779
38   2500 DATA 64,0,0,128,0,0,0,0
     ,0,0,0,0,0,0,0,90,282
01   2510 DATA 0,0,1,0,0,1,0,0,1,
     0,0,1,255,255,255,127,896
AC   2520 DATA 255,255,31,255,255
     ,15,255,255,15,255,255,7,255
     ,255,7,255,2880
06   2530 DATA 252,7,254,0,0,0,0,
     0,0,0,0,0,0,0,0,0,513
82   2540 DATA 0,0,0,0,0,0,0,0,0,
     0,0,1,0,0,1,91,93
38   2550 DATA 0,0,0,0,0,0,0,0,0,
     0,0,0,255,255,254,255,1019
4B   2560 DATA 255,248,255,255,0,
     255,248,0,255,128,0,252,0,0,
     76,0,2227
40   2570 DATA 0,24,0,0,56,0,0,56
     ,0,0,120,0,0,104,0,0,360
B1   2580 DATA 112,0,0,48,0,0,96,
     0,0,160,0,0,48,0,0,1,465
0A   2590 DATA 0,0,0,0,0,0,0,0,0,
     0,0,0,15,0,0,7,22
F2   2600 DATA 224,0,3,252,0,1,25
     5,128,1,255,240,0,255,254,0,
     63,1931
FB   2610 DATA 255,0,31,255,0,7,2
     55,0,7,255,0,1,255,0,0,63,13
     84
64   2620 DATA 0,0,40,0,0,36,0,0,
     36,0,0,54,0,0,0,6,172
83   2630 DATA 0,0,0,0,0,0,0,0,0,
     0,0,0,0,0,0,0,0,0
88   2640 DATA 0,0,8,0,0,8,0,0,16
     ,0,0,16,0,0,224,0,272
FC   2650 DATA 0,248,0,0,255,128,
     0,255,240,0,255,254,0,255,25
     5,192,2337
0B   2660 DATA 0,15,248,0,0,31,0,
     0,0,0,0,0,0,0,0,253,547
50   2670 DATA 0,0,0,0,0,0,0,0,0,
     15,0,0,7,224,0,3,249
10   2680 DATA 252,0,1,255,128,1,
     255,240,0,255,254,0,63,255,0
     ,31,1990
9B   2690 DATA 255,0,7,255,0,7,25
     5,0,1,255,0,0,63,0,0,7,1105
C3   2700 DATA 0,0,0,0,0,0,0,0,1,
     0,0,1,0,0,1,6,9
33   2710 DATA 0,0,0,0,0,0,0,0,0,
     0,0,0,0,0,0,0,0,0
13   2720 DATA 0,0,4,0,0,4,0,0,8,
     0,0,200,0,0,248,0,464
C4   2730 DATA 0,252,0,0,255,0,0,
     255,192,0,255,240,0,255,252,
     0,1956
44   2740 DATA 255,255,0,129,255,
     192,128,15,240,0,0,252,0,0,0
     ,0,1721
```

PROGRAM: AIRCRAFT DISPLAY

```
85   10 rem*********************
     ****
31   20 rem* sprite lirbary displ
     ay *
e3   30 rem*      aircraft
     *
cb   40 rem*********************
     ****
6f   50 poke55,0:poke56,40:x=x+1:
     ifx=1thenload"aircraft",8,1
5a   60 v=53248:print"[cls][blu][
     26cd][9cr][rev]f7 to stop an
     imation"
86   70 pokev+21,15:pokev+23,12:p
     okev+29,12:pokev+32,1:pokev+
     33,1:pokev+39,0
6d   80 pokev+40,0:pokev+41,0:pok
     ev+42,0:pokev,80:pokev+1,150
     :pokev+2,104:pokev+3,150
9c   90 pokev+4,200:pokev+5,150:p
     okev+6,248:pokev+7,150
8d   100 input"[hom][cd]start spr
     ite";s:input"end sprite";e:i
     nput"delay";d
05   110 forsp=stoestep2:fort=0to
     d:next:print"[hom]"tab(23)"s
     prite no.="";sp:poke2040,sp
37   120 poke2041,sp+1:poke2042,s
     p:poke2043,sp+1:next:getk$:i
     fk$="[f7]"then100
3d   130 goto110
```

PROGRAM: ADV LOADER 3

```
af   10 rem*********************
     *
9d   20 rem* adventure kit part3
     *
3e   30 rem*    object module
     *
9d   40 rem*********************
     *
ee   2000 forl=0to45:cx=0:ford=0t
     o15:reada:cx=cx+a:poke49152+
     l*16+d,a:nextd
82   2010 reada:ifa<>cxthenprint"
     error in line";2040+(l*10):s
     top
0f   2020 nextl:end
f8   2040 data76,33,192,76,66,192
     ,76,83,192,76,104,192,76,146
     ,192,76,1848
a1   2050 data161,193,76,231,193,
     76,10,194,76,50,194,76,73,19
     4,16,15,1828
b0   2060 data1,32,137,194,141,76
```

```
     .3.32.137,194.141,72.3.32.97
     .194.1486
52   2070 data160.0.177.251.140.7
     8,3.205.72.3.208,5.169,255.1
     41.78.1945
87   2080 data3.96.32.137.194.141
     .76.3.32.97.194.160.2.177.25
     1.141.1736
4e   2090 data79.3.96.32.137.194.
     141.76.3.32.39.192.173.78.3.
     240.1518
19   2100 data6.160.0.169.255.145
     ,251,96,32.137,194.141.76.3.
     32.137.1834
17   2110 data194.141.83.3.169.25
     5.141.72.3.32.45.192.173.78.
     3.240.1824
81   2120 data16.32,97,194.160.0.
     173,83.3.145.251.160.1.169.0
     .145.1629
5c   2130 data251.96.32.137.194.1
     41.72.3.32.137.194.141.73.3.
     32.137.1675
c3   2140 data194.141.75.3.173.73
     .3.208.11.169.0.141.74.3.141
     .78.1487
06   2150 data3.76.186.192.32.137
     .194.141.74.3.169.0.141.76.3
     .141.1568
98   2160 data82.3.32.22.193.32.9
     7.194.160.0.177.251.205.72.3
     .208.1731
3f   2170 data34.238.82.3.173.78.
     3.240.12.160.1.177.251.240.6
     .173.1871
4f   2180 data32.192.141.134.2.17
     3.73.3.240.6.32.41.193.76.24
     3.192.1773
89   2190 data32.87.193.238.76.3.
     173.76.3.205.81.3.208.199.17
     3.73.1823
89   2200 data3.208.3.32.153.193.
     173.82.3.208.10.32.151.194.1
     69.196.1810
12   2210 data160.194.32.30.171.9
     6.32.151.194.173.77.3.240.10
     .169.167.1899
11   2220 data160.194.32.30.171.2
     38.75.3.96.32.151.194.24.165
     .251.105.1921
cb   2230 data4.133.253.165.252.1
     05.0.133.254.160.3.177.251.1
     41.83.3.2117
5b   2240 data160.0.177.253.32.21
     0.255.200.204.83.3.208.245.2
     38.75.3.2346
a3   2250 data173.31.192.141.134.
     2.96.160.3.177.251.141.83.3.
     32.162.1781
84   2260 data194.24.152.109.83.3
     .201.40.144.9.238.75.3.32.15
     3.193.1653
36   2270 data32.151.194.24.165.2
     51.105.4.133.253.165.252.105
     .0.133.254.2221
c7   2280 data160.0.177.253.32.21
     0.255.200.204.83.3.208.245.1
     73.31.192.2426
4f   2290 data141.134.2.169.44.32
     .210.255.96.169.204.160.194.
     32.30.171.2043
a5   2300 data96.32.137.194.141.7
     3.3.32.137.194.141.75.3.173.
     73.3.1507
b4   2310 data208.8.169.0.141.74.
     3.76.192.193.32.137.194.141.
     74.3.1645
dc   2320 data169.0.141.76.3.141.
     82.3.169.1.141.78.3.32.151.1
     94.1384
a1   2330 data173.77.3.240.10.169
     .178.160.194.32.30.171.238.7
     5.3.169.1922
90   2340 data255.141.72.3.76.197
     .192.32.137.194.141.76.3.32.
     97.194.1842
6d   2350 data160.0.177.251.201.2
     55.240.6.169.0.141.78.3.96.1
     69.255.2201
81   2360 data141.78.3.169.1.160.
     1.145.251.96.32.137.194.141.
     81.3.1633
20   2370 data32.137.194.141.30.1
     92.32.137.194.141.31.192.141
     .134.2.32.1762
8f   2380 data137.194.141.32.192.
     32.137.194.141.32.208.32.137
     .194.141.33.1977
62   2390 data208.96.32.137.194.1
     41.76.3.32.137.194.141.72.3.
     32.97.1595
5b   2400 data194.160.0.173.72.3.
     145.251.96.32.137.194.141.76
     .3.160.1837
0a   2410 data1.177.251.208.6.169
     .255.141.78.3.96.169.0.141.7
     8.3.1776
c9   2420 data96.169.0.133.251.16
     9.128.133.252.24.173.30.192.
     105.4.141.2000
9c   2430 data80.3.172.76.3.240.1
     7.24.165.251.109.80.3.133.25
     1.165.1772
60   2440 data252.105.0.133.252.1
     36.208.239.96.32.253.174.32.
     138.173.32.2255
93   2450 data247.183.165.20.164.
     21.96.174.75.3.172.74.3.24.3
     2.240.1693
a5   2460 data255.96.56.32.240.25
     5.96.73.32.67.65.78.32.83.69
     .69.1598
da   2470 data13.0.89.79.85.32.65
     .82.69.32.67.65.82.82.89.73.
     1004
8c   2480 data78.71.13.0.78.79.84
     .72.73.78.71.0.157.32.13.0.8
     99
3d   2490 data1.32.4.153.245.36.1
     98.85.127.140.246.38.198.86.
     160.143.1892
```

PROGRAM: ADV EDITOR 3

```
4b   10 iffl=1then fl=2: loadfi$.
     de.1
05   20 iffl=2 goto50
6c   30 poke 56.96:clr: sa=8*4096

66   40 poke 53280.0:poke53281.0:
     poke646.15
83   50 printchr$(147)tab(15)"obj
     ect editor"
cc   60 print"[down3]"tab(12)"1.
     setup database"
94   70 printtab(12)"2. alter ent
     ry"
5c   80 printtab(12)"3. test loca
     tion"
6c   90 printtab(12)"4. save data
     base"
5c   100 printtab(12)"5. load dat
     abase"
91   110 printtab(12)"6. show ent
     ries"
fc   120 geti$:ifi$<"1"ori$>"6"th
     en120
d1   130 on val(i$) goto 140.220.
     330.570.380.420
ef   140 input"[clr]input length
     of name";nl
9e   150 input "[down]number of o
     bjects";no
8a   160 if (nl+4)*no<2048 then 1
     80
25   170 print"insufficient memor
     y...try again":ford=1to1000:
     next:goto140
84   180 sys12*4096+21.no.nl.15.1
     5.0.0
c6   190 print"[down3]initialisin
     g...."
b8   200 fori=0to(nl+4)*no: poke
     sa+i.0:next
a0   210 goto50
88   220 input"[clr]object number
     ";ob:if ob>peek(849)-1then22
     0
0e   230 nl=peek(49182):ad=sa+(nl
     +4)*ob
b8   240 gosub490
17   250 input"[down2]location":a
     : poke ad.a
6e   260 input"worn flag";a: poke
      ad+1.a
25   270 input"weight":a: pokead+
     2.a
7d   280 input "object name";a$:i
     f len(a$)>16 then a$=left$(a
     $.16)
ab   290 poke ad+3.len(a$)
5c   300 fori=0topeek(ad+3)-1
dc   310 poke ad+4+i.asc(mid$(a$.
     i+1.1)):next
cd   320 goto50
9b   330 input"[clr]location numb
     er";lo
f9   340 print"[down2]location"lo
     " contains"
b1   350 sys 12*4096+12.lo.0.6
a9   360 geti$:ifi$=""then360
1f   370 goto50
2e   380 input "[clr]input file n
     ame";fi$
b0   390 input"[down]device (8=di
     sk...1=cassette)";de
d8   400 print"[down3]loading tab
     les ......."
7e   410 fl=1:goto10
eb   420 nl=peek(49182):printchr$
     (147)
56   430 for ob=0topeek(849)-1:pr
     int"object"ob:print"[ct9]"
81   440 gosub490
24   450 print"------------------
     ------------":print:print
8a   460 geti$:ifi$=""then460
55   470 next
ad   480 goto50
ce   490 ad=sa+(nl+4)*ob
ed   500 print"[down]location";pe
     ek(ad)
ea   510 print"worn flag";peek(ad
     +1)
cc   520 print"weight";peek(ad+2)

f7   530 print"object name ";: fo
     ri=0topeek(ad+3)-1
e0   540 c=peek(ad+4+i):ifc=0 the
     n c=42
04   550 printchr$(c);:next:print

bc   560 return
65   570 restore:for i=870to924:r
     eadx:pokei.x:t=t+x:next
e7   580 if t<>5940 then print"da
     ta error": end
5d   590 fa=sa+(peek(49182)+4)*pe
     ek(849)
a3   600 input "[clr]input file n
     ame";fi$
c3   610 input"[down]device (8=di
     sk...1=cassette)";de
75   620 print"[down3]saving tabl
```

```
   es ........"
e2 630 sys 870 fi$,de,2,sa,fa
4e 640 goto 50
cf 650 data 32,212,225,32,253,1
   74,32,138,173,32,247,183,165
   ,20,72,165,21,72,32,253
9c 660 data 174,32,138,173,32,2
   47,183,165,1,41,254,133,1,16
   6,20,164,21,104,133,21
37 670 data 104,133,20,169,20,3
   2,95,225,165,1,9,1,133,1,96
```

PROGRAM: ADV DEMO 3

```
85 10 rem*****************
8c 20 rem* adv kit part 3 *
f6 30 rem* demonstration  *
db 40 rem*****************
98 50 sa=12*4096
14 60 n=4: rem object numbers
b5 70 l=16: rem name length
ad 80 sys sa+21,4,16,15,1,0,0:
   rem setup
60 90 gosub290
1a 100 geti$:ifi$=""then100
db 110 if i$="l"then gosub290:g
   oto100
1a 120 ifi$="t"then160
52 130 ifi$="i"then190
63 140 ifi$="d"then200
87 150 ifi$="w"then230
64 160 input "[home,down9]take
   item number";in
d5 170 syssa+6,in,1 :ifpeek(846
   )=0thenprint"not here":goto1
   00
e6 180 print"taken":goto100
03 190 gosub290:print"[home,dow
   n10]you have":syssa+15,0,11:
   goto100
2c 200 input "[home,down9]drop
   item number";in
ec 210 syssa+9,in,1 :ifpeek(846
   )=0thenprint"you ain't got i
   t":goto100
21 220 print"dropped":goto100
f3 230 input"[home,down10]wear
   item number";in
17 240 syssa+27,in:ifpeek(846)=
   0thenprint"you're wearing it
   ":goto100
60 250 syssa+18,in
75 260 if peek(846)=0thenprint"
   you don't have that"
be 270 ifpeek(846)=255thenprint
   "you are now wearing it"
21 280 goto100
b1 290 print"[clr]location 1":s
   ys sa+12,1,0,2
8f 300 print"[down13]"tab(16)"[
   rvson]l[rvsoff]ook"
80 310 printtab(16)"[rvson]t[rv
   soff]ake"
dc 320 printtab(16)"[rvson]d[rv
   soff]rop"
a0 330 printtab(16)"[rvson]w[rv
   soff]ear"
e1 340 printtab(16)"[rvson]i[rv
   soff]nventory"
d1 350 return
```

PROGRAM: 8 WAY SCROLL BAS

```
45 1 data 120,169,78,141,20,3,1
   69,192,141,21,3
d7 2 data 173,26,208,9,1,141,26
   ,208,173,17,208
84 3 data 41,127,141,17,208,169
   ,252,141,18,208,173
5e 4 data 2,221,9,3,141,2,221,1
   73,0,221,41
7f 5 data 252,9,2,141,0,221,173
   ,14,220,41,254
19 6 data 141,14,220,88,169,0,1
   41,32,208,141,33
ae 7 data 208,169,0,141,230,193
   ,169,128,141,231,193
3a 8 data 96,173,239,193,240,89
   ,201,1,208,6,32
75 9 data 139,193,76,172,192,20
   1,2,208,6,32,105
b3 10 data 193,76,172,192,201,3
   ,208,6,32,71,193
95 11 data 76,172,192,201,4,208
   ,6,32,37,193,76
e2 12 data 172,192,201,5,208,9,
   32,37,193,32,139
f3 13 data 193,76,172,192,201,6
   ,208,9,32,139,193
72 14 data 32,71,193,76,172,192
   ,201,7,208,9,32
13 15 data 105,193,32,37,193,76
   ,172,192,201,8,208
14 16 data 6,32,105,193,32,71,1
   93,169,191,141,20
fd 17 data 3,169,192,141,21,3,1
   73,232,193,141,18
e2 18 data 208,76,26,193,169,8,
   141,22,208,169,23
d3 19 data 141,17,208,169,54,14
   1,24,208,169,237,141
f8 20 data 20,3,169,192,141,21,
   3,169,7,141,32
77 21 data 208,32,15,194,169,0,
   141,32,208,169,252
30 22 data 141,18,208,76,26,193
   ,173,22,208,41,0
42 23 data 9,16,13,235,193,141,
   22,208,173,17,208
2b 24 data 41,248,13,236,193,14
   1,17,208,169,36,141
5e 25 data 24,208,169,6,141,32,
   208,32,173,193,169
fa 26 data 0,141,32,208,76,78,1
   92,169,1,141,25
f2 27 data 208,104,168,104,170,
   104,64,173,22,208,9
de 28 data 248,24,109,233,193,4
   1,7,141,235,193,144
52 29 data 17,56,173,230,193,23
   3,1,141,230,193,173
97 30 data 231,193,233,0,141,23
   1,193,96,173,22,208
4b 31 data 41,7,56,237,233,193,
   41,7,141,235,193
83 32 data 176,17,24,173,230,19
   3,105,1,141,230,193
93 33 data 173,231,193,105,0,14
   1,231,193,96,173,17
43 34 data 208,9,248,24,109,234
   ,193,41,7,141,236
e9 35 data 193,144,17,56,173,23
   0,193,233,240,141,230
93 36 data 193,173,231,193,233,
   0,141,231,193,96,173
63 37 data 17,208,41,7,56,237,2
   34,193,41,7,141
9c 38 data 236,193,176,17,24,17
   3,230,193,105,240,141
5e 39 data 230,193,173,231,193,
   105,0,141,231,193,96,173
56 40 data 169,0,133,253,169,72
   ,133,254,173,230,193
f1 41 data 133,251,173,231,193,
   133,252,162,18,160,0
8d 42 data 177,251,145,253,200,
   192,40,208,247,165,251
02 43 data 24,105,240,133,251,1
   44,2,230,252,165,253
37 44 data 24,105,40,133,253,14
   4,2,230,254,202,208
90 45 data 220,96,0,128,189,1,1
   ,0,0,0,0
4c 46 data 0,173,0,220,160,0,16
   2,0,74,176,1
ad 47 data 136,74,176,1,200,74,
   176,1,202,74,176
8b 48 data 1,232,74,142,237,193
   ,140,238,193,96,32
15 49 data 240,193,174,237,193,
   172,238,193,138,208,7
b3 50 data 152,208,4,141,239,19
   3,96,224,0,208,20
4e 51 data 192,255,208,6,169,2,
   141,239,193,96,192
96 52 data 1,208,5,169,1,141,23
   9,193,96,192,0
d5 53 data 208,20,224,255,208,6
   ,169,4,141,239,193
af 54 data 96,224,1,208,5,169,3
   ,141,239,193,96
05 55 data 192,255,208,20,224,1
   ,208,6,169,8,141
82 56 data 239,193,96,224,255,2
   08,237,169,7,141,239
80 57 data 193,96,192,1,208,19,
   224,1,208,6,169
63 58 data 6,141,239,193,96,224
   ,255,208,5,169,5
be 59 data 141,239,193,96,0
06 60 :
07 61 :
87 98 print chr$(147)
47 99 print:print:print"the num
   ber printed is the current d
   ata line number"
7e 100 t=0:for a=49152to49794
3d 110 read b:pokea,b:t=t+b
63 115 printchr$(19);peek(63)+2
   56*peek(64)
5b 120 next a
6c 130 if t<>83841 thenprint"e
   rror in data":end
71 140 sys 49152
16 150 end
```

PROGRAM: 8 WAY SCROLL MC

```
10 *=49152
11 ;
12 ; DISABLE INTERUPTS.SET UP
13 ; INTERUPT VECTOR.ENABLE RASTER
14 ; INTERUPT.SET UP VIC BANKS.
15 ; DISABLE HARDWARE TIMER A.
16 ; RE-ENABLE INTERUPTS.
17 ;
20 SEI ;SEI
30 LDA #<INTR
40 STA 788
50 LDA #>INTR
60 STA 789
70 LDA 53274
80 ORA #1
90 STA 53274
100 LDA 53265
110 AND #127
120 STA 53265
130 LDA #252
140 STA 53266
150 LDA 56578
160 ORA #3
170 STA 56578
180 LDA 56576
190 AND #252
200 STA 56576
220 LDA 56334
230 AND #254
240 STA 56334
250 CLI
251 ;
252 ; SET SCREEN COLOURS
253 ; SET START VALUES TO BE
254 ; STORED IN MAP & MAP+1
255 ; (SEE WINDOW)
256 ;
260 LDA #0
```

```
270 STA 53280
280 STA 53281
290 LDA #<32768
300 STA MAP
310 LDA #>32768
320 STA MAP+1
997 !
998 RTS
1000 !
1001 ! CHECK TO SEE IF A SCROLL
1002 ! IS TAKING PLACE.IF NOT JUMP
1003 ! TO 'NOSCROLL' OTHERWISE
1004 ! CHECK TO SEE WHICH OF THE 8
1005 ! POSSIBLE DIRECTIONS WE ARE
1006 ! SCROLLING IN AND PROCESS.
1007 !
1020 INTR LDA WAY
1030 BEQ NOSCROLL
1040 CMP #1
1050 BNE W1
1060 JSR YSUB
1070 JMP NOSCROLL
1080 W1 CMP #2
1090 BNE W2
1100 JSR YADD
1110 JMP NOSCROLL
1120 W2 CMP #3
1130 BNE W3
1140 JSR XSUB
1150 JMP NOSCROLL
1160 W3 CMP #4
1170 BNE W4
1179 JSR XADD
1180 JMP NOSCROLL
1181 W4 CMP #5
1182 BNE W5
1183 JSR XADD
1184 JSR YSUB
1185 JMP NOSCROLL
1186 W5 CMP #6
1187 BNE W6
1188 JSR YSUB
1189 JSR XSUB
1190 JMP NOSCROLL
1191 W6 CMP #7
1192 BNE W7
1193 JSR YADD
1194 JSR XADD
1195 JMP NOSCROLL
1196 W7 CMP #8
1197 BNE NOSCROLL
1198 JSR YADD
1199 JSR XSUB
1200 !
1210 ! SET UP LOCATION OF RASTER
1211 ! SPLIT AND RE-VECTOR THE
1212 ! INTERUPT TO PROCESS THE
1213 ! STATUS LINE (NON MOVING
1214 ! SCREEN) ROUTINE.
1215 !
1220 NOSCROLL LDA #<STATLINE
1250 STA 788
1260 LDA #>STATLINE
1270 STA 789
1280 LDA RASTER
1290 STA 53266
1300 JMP EXINT
1301 !
1302 ! SET 40 COLUMN SCREEN,
1303 ! CLEAR SCROLL REGISTERS TO
1304 ! ENSURE THIS SECTION OF THE
1305 ! SCREEN IS STILL,RE-VECTOR
1306 ! THE INTERUPT TO PROCESS THE
1307 ! ROUTINE DEALING WITH THE
1308 !-SCROLLING SECTION OF THE
1309 ! SCREEN,JSR TO 'CONTROL' ROUTINE
1310 !
1315 STATLINE LDA #8
1320 STA 53270
1330 LDA #23
1340 STA 53265
1350 LDA #54
1360 STA 53272
1370 LDA #<GAMEAREA
1380 STA 788
1390 LDA #>GAMEAREA
1400 STA 789
1405 LDA #7
1406 STA 53280
1410 JSR CONTROL
1415 LDA #0
1416 STA 53280
1420 LDA #252
1430 STA 53266
1440 JMP EXINT
1441 !
1442 ! SET 38 COLUMN,24 ROW SCREEN
1443 ! PRINT UP SCREEN FROM
1444 ! MAP & MAP+1,SET VALUES OF
1445 ! SCROLL REGISTERS.
1446 !
1450 GAMEAREA LDA 53270
1455 AND #0
1456 ORA #16
1470 ORA XSCROLL
1480 STA 53270
1490 LDA 53265
1500 AND #248
1510 ORA YSCROLL
1520 STA 53265
1610 LDA #36
1620 STA 53272
1625 LDA #6
1626 STA 53280
1650 JSR WINDOW
1651 LDA #0
1652 STA 53280
1654 JMP INTR
1655 !
1656 ! SIGNAL THAT INTERUPT HAS BEEN
1657 ! PROCESSED,RESTORE REGISTERS
1658 ! AND RETURN FROM INTERUPT.
1659 !
1660 EXINT LDA #1
1670 STA $D019
1690 PLA
1700 TAY
1710 PLA
1720 TAX
1730 PLA
1740 RTI
1741 !
1742 ! HARDWARE SCROLL SCREEN 1 PIXEL
1743 ! TO THE RIGHT.IF SCREEN HAS
1744 ! MOVED MORE THAN 1 CHAR. THEN
1745 ! SUBTRACT 1 FROM 16 BIT VALUE IN
1746 ! MAP & MAP+1.
1747 !
1750 XADD LDA 53270
1760 ORA #248
1770 CLC
1780 ADC XSPEED
1790 AND #7
1800 STA XSCROLL
1810 BCC EXXADD
1820 SEC
1830 LDA MAP
1840 SBC #1
1850 STA MAP
1860 LDA MAP+1
1870 SBC #0
1880 STA MAP+1
1960 EXXADD RTS
1961 !
1962 ! HARDWARE SCROLL SCREEN 1 PIXEL
1963 ! TO THE LEFT.IF SCREEN HAS
1964 ! MOVED MORE THAN 1 CHAR. THEN
1965 ! ADD 1 TO 16 BIT VALUE
1966 ! IN MAP & MAP+1.
1967 !
1970 XSUB LDA 53270
1980 AND #7
1990 SEC
2000 SBC XSPEED
2010 AND #7
2020 STA XSCROLL
2030 BCS EXXSUB
2040 CLC
2050 LDA MAP
2060 ADC #1
2070 STA MAP
2080 LDA MAP+1
2090 ADC #0
2100 STA MAP+1
2180 EXXSUB RTS
2181 !
2182 ! HARDWARE SCROLL THE SCREEN
2183 ! DOWN 1 PIXEL. IF SCREEN HAS
2184 ! MOVED MORE THAN 1 CHAR THEN
2185 ! SUBTRACT NUMBER OF SCREENS
2186 ! HORIZONTALLY IN MAP MULTIPLYED
2187 ! BY 40 FROM 16 BIT VALUE IN
2188 ! MAP & MAP+1.
2189 ! EG:-
2190 ! IF THERE ARE 6 SCREEN ACROSS
2191 ! IN MAP THEN SUBTRACT 240.
2192 !
2199 YADD LDA 53265
2200 ORA #248
2210 CLC
2220 ADC YSPEED
2230 AND #7
2240 STA YSCROLL
2250 BCC EXYADD
2260 SEC
2270 LDA MAP
2280 SBC #240
2290 STA MAP
2300 LDA MAP+1
2310 SBC #0
2320 STA MAP+1
2400 EXYADD RTS
2401 !
2402 ! AS ABOVE BUT SCROLL UP 1 PIXEL
2403 ! AND ADD SAME VALUE IF
2404 ! NECESSARY.
2405 !
2410 YSUB LDA 53265
2420 AND #7
2430 SEC
2440 SBC YSPEED
2450 AND #7
2460 STA YSCROLL
2470 BCS EXYSUB
2480 CLC
2490 LDA MAP
2500 ADC #240
2510 STA MAP
2520 LDA MAP+1
2530 ADC #0
2540 STA MAP+1
2620 EXYSUB RTS
4000 !
4001 ! (SEE DIAGRAM 1 ):-
4002 ! PRINT UP 1000 BYTES TO SCREEN.
4003 ! ( SCREEN IS AT 17408).
4004 ! STARTING AT MEMORY LOCATION
4005 ! POINTED AT BY VALUES IN
4006 ! MAP & MAP+1.
4007 !
4070 WINDOW LDA #<18432
4080 STA 253
4090 LDA #>18432
4100 STA 254
4120 LDA MAP
4130 STA 251
4140 LDA MAP+1
4150 STA 252
4160 LDX #18
4180 WINDLOOP1 LDY #0
4190 WINDLOOP2 LDA (251),Y
4200 STA (253),Y
4210 INY
4215 CPY #40
4220 BNE WINDLOOP2
4230 LDA 251
4240 CLC
4250 ADC #240
4260 STA 251
4270 BCC WINDLP2
4290 INC 252
4300 WINDLP2 LDA 253
4310 CLC
4320 ADC #40
4330 STA 253
4340 BCC EXCAL
4360 INC 254
4370 EXCAL DEX
4376 BNE WINDLOOP1
4390 RTS
4400 !
4410 ! VARIABLES AS FOLLOWS :-
4411 !
4412 ! 1 - LO,HI ADDRESS OF SCREEN
4413 ! (ROW 0,COLUMN 0) IN OVERALL MAP
4414 ! 2 - POSISTION OF RASTER SPLIT
4415 ! 3 - SPEED OF X SCROLL
4416 ! 4 - SPEED OF Y SCROLL
4417 ! 5 - VALUE OF X SCROLL REGISTER
4418 ! 6 - VALUE OF Y SCROLL REGISTER
4419 ! 7 - JOYSTICK X VALUE
4420 ! 8 - JOYSTICK Y VALUE
4421 ! 9 - DIRECTION OF SCROLL (0-8)
4422 !
6000 MAP BYT <32768,>32768
6030 RASTER BYT 189
6060 XSPEED BYT 1
6070 YSPEED BYT 1
6080 XSCROLL BYT 0
6090 YSCROLL BYT 0
6100 DX BYT 0
6110 DY BYT 0
6160 WAY BYT 0
6161 !
6162 ! THE VALUES IN WAY INDICATE
6163 ! THE FOLLWING:-
6164 !
6165 ! 0 - NO SCROLLING
6166 ! 1 - SCROLL UP
6167 ! 2 - SCROLL DOWN
6168 ! 3 - SCROLL LEFT
6169 ! 4 - SCROLL RIGHT
6170 ! 5 - SCROLL UP & RIGHT
6171 ! 6 - SCROLL UP & LEFT
```

```
6172 ! 7 - SCROLL DOWN & RIGHT
6173 ! 8 - SCROLL DOWN & LEFT
6174 !
6179 !
6180 ! JOYSTICK READING ROUTINE.
6181 ! SEE PAGE 345 OF PROGRAMMERS
6182 ! REFERENCE GUIDE FOR FULL
6183 ! EXPLANATION.
6184 !
7000 JOYREAD LDA 56320
7010 LDY #0
7020 LDX #0
7025 !
7030 LSR A
7040 BCS JOY0
7050 DEY
7060 JOY0 LSR A
7070 BCS JOY1
7080 INY
7090 JOY1 LSR A
7100 BCS JOY2
7110 DEX
7120 JOY2 LSR A
7130 BCS JOY3
7140 INX
7150 JOY3 LSR A
7160 STX DX
7170 STY DY
7180 RTS
7190 !
7191 ! MAIN CONTROL ROUTINE :-
7192 ! DECIDE WHICH DIRECTION TO
7193 ! SCROLL.
7194 !
8000 CONTROL JSR JOYREAD
8010 LDX DX
8020 LDY DY
8021 TXA
8022 BNE VERTICAL
8023 TYA
8024 BNE VERTICAL
8025 STA WAY
8026 RTS
8030 VERTICAL CPX #0
8040 BNE HORIZONTAL
8050 UPC CPY #255
8060 BNE DOWNC
8070 LDA #2
8080 STA WAY
8090 RTS
8100 DOWNC CPY #1
8110 BNE XVERT
8120 LDA #1
8130 STA WAY
8140 XVERT RTS
8150 HORIZONTAL CPY #0
8160 BNE DIAGONAL
8170 LEFTC CPX #255
8180 BNE RIGHTC
8190 LDA #4
8200 STA WAY
8210 RTS
8220 RIGHTC CPX #1
8230 BNE OUTCON
8240 LDA #3
8250 STA WAY
8260 OUTCON RTS
8270 DIAGONAL CPY #255
8280 BNE DIAGDOWN
8290 CPX #1
8300 BNE UPLFT
8310 UPRGHT LDA #8
8320 STA WAY
8330 RTS
8340 UPLFT CPX #255
8350 BNE OUTCON
8360 LDA #7
8370 STA WAY
8380 RTS
8390 DIAGDOWN CPY #1
8400 BNE XDIAG
8410 CPX #1
8420 BNE DWNLFT
8440 DWNRGHT LDA #6
8450 STA WAY
8460 RTS
8470 DWNLFT CPX #255
8480 BNE XDIAG
8490 LDA #5
8500 STA WAY
8510 XDIAG RTS
8520 !
8530 END
```

BYTING INTO THE 6510

```
10              ORG 49152
20    ;
30    SCREENMEM EQU 251
40    SCREENCOL EQU 253
50    ;
60    GETIN     EQU $FFE4
70    ;
80    ;
90    ;INITIATE SCREEN AND COLOUR VARS.
100   ;
110             LDA #<1024
120             STA <SCREENMEM
130             LDA #>1024
140             STA >SCREENMEM
150   ;
160             LDA #<55296
170             STA <SCREENCOL
180             LDA #>55296
190             STA >SCREENCOL
200   ;
210   ;CLEAR THE SCREEN.
220   ;
230             JSR $E544
240   ;
250   ;SWITCH COMPUTER INTO
260   ;BUSINESS MODE.
270   ;
280             LDA #14
290             JSR $E716
300   ;
310   ;WAIT FOR KEYPRESS.
320   ;
330   GETKEY    JSR GETIN
340             BEQ GETKEY
350   ;
360   ;IF F1 PRESSED, EXIT.
370   ;
380             CMP #133
390             BEQ EXIT
400   ;
410   ;IF DELETE KEY HAS BEEN PRESSED,
420   ;JUMP TO DELETION ROUTINE.
430   ;
440             CMP #20
450             BEQ DELETE
460   ;
470   ;CONVERT ASCII INTO SCREEN CODE.
480   ;
490             CMP #128
500             BCC SKIP
510             SEC            ;UPPER CASE
520             SBC #64
530   SKIP      CMP #64        ;LOWER CASE
540             BCC PRINT
550             SEC
```

```
560                 SBC #64
570     ;
580     ;PRINT CHARACTER ONTO SCREEN.
590     ;
600     PRINT       LDY #0
610                 STA (SCREENMEM),Y
620                 LDA #6
630                 STA (SCREENCOL),Y
640     ;
650     ;ADVANCE TO NEXT PRINT POSITION.
660     ;
670                 INC <SCREENMEM
680                 BNE NOHIGH
690                 INC >SCREENMEM
700     ;
710     NOHIGH      INC <SCREENCOL
720                 BNE GETKEY
730                 INC >SCREENCOL
740                 BNE GETKEY
750     ;
760     ;
770     ;
780     ;DELETION RQUTINE:
790     ;
800     ;IF BEG. OF SCREEN, EXIT
810     ;
820     DELETE      LDA #<1024
830                 CMP <SCREENMEM
840                 BNE DELETE1
```

```
850                 LDA #>1024
860                 CMP >SCREENMEM
870                 BEQ GETKEY
880     ;
890     ;GO ONE POSITION BACKWARDS
900     ;
910     DELETE1     LDA <SCREENMEM
920                 BNE NOHIGH1
930                 DEC >SCREENMEM
940     NOHIGH1     DEC <SCREENMEM
950     ;
960                 LDA <SCREENCOL
970                 BNE NOHIGH2
980                 DEC >SCREENCOL
990     NOHIGH2     DEC <SCREENCOL
1000    ;
1010    ;AND PRINT SPACE OVER LETTER.
1020    ;
1030                LDY #0
1040                LDA #32          ;SPACE
1050                STA (SCREENMEM),Y
1060                LDA #6           ;BLUE
1070                STA (SCREENCOL),Y
1080    ;
1090                JMP GETKEY
1100    ;
1110    ;EXIT: RETURN TO BASIC
1120    ;
1130    EXIT        RTS
```

PROGRAM: BUD MON CREATE

```
D3   10 REM CREATE BUDGET SUBJECT
     S
83   20 DIMCH$(20),NB(20),NC(20)
59   30 OPEN2,8,2,"@0:BUDGET SUBJ
     ECTS,S,W"
68   40 FORA=1TO16
F8   50 CH$(A)=" ":NB(A)=0:NC(0)=
     0
9F   60 NEXT A
B6   70 FORA=1TO16
B7   80 PRINT#2,CH$(A)
F6   90 PRINT#2,NB(A)
A3   100 PRINT#2,NC(A)
4D   110 NEXT A
0A   120 CLOSE2
```

PROGRAM: BUD SUB CREATE

```
98   10 DIM M$(20)
39   20 OPEN2,8,2,"@0:BUDGET MONT
     HS,S,W"
AA   30 FORA=1 TO 12
E6   40 READ M$(A)
D0   50 M$(A)="[SSPC]"+M$(A)
F3   60 PRINT#2,M$(A)
A5   70 NEXT A
22   80 CLOSE2
F3   90 DATA JAN,FEB,MAR,APR,MAY,
     JUN,JUL,AUG,SEP,OCT,NOV,DEC
```

PROGRAM: BUD DATA CREATE

```
1F   2 DIM Y$(192),H$(192)
DF   4 DIM SR$(16),SS$(16),SU$(16
     )
FE   6 DIM BA$(16),BB$(16),BC$(16
     )
61   8 DIM GT(3)
A4   10 REM PROG TO SET UP BUDGET
      DATA
09   20 FOR A=1 TO 192
4F   30 Y$(A)="[SSPC]000":H$(A)="
     000"
8B   40 NEXT A
32   50 FORA=1TO16
ED   60 SR$(A)="[SSPC]0000":SS$(A
     )="[SSPC]0000":SU$(A)="[SSPC
     ]0000"
D8   70 BA$(A)="[SSPC]0000":BB$(A
     )="[SSPC]0000":BC$(A)="[SSPC
     ]0000"
B3   80 NEXT A
A4   90 GT(1)=0:GT(2)=0:GT(3)=0
0E   100 OPEN2,8,2,"@0:BUDGET DAT
     A,S,W"
05   110 PRINT#2,SR
CC   120 PRINT#2,CM
B7   130 FORA=1 TO 192
77   140 PRINT#2,Y$(A)
75   150 NEXT A
7D   160 FOR A=1 TO 192
C6   170 PRINT#2,H$(A)
17   180 NEXT A
26   190 FOR A=1 TO 12
89   200 PRINT#2,SR$(A)
54   210 PRINT#2,SS$(A)
5C   220 PRINT#2,SU$(A)
C5   230 NEXT A
DE   240 FOR A= 1 TO 16
11   250 PRINT#2,BA$(A)
CD   260 PRINT#2,BB$(A)
C8   270 PRINT#2,BC$(A)
FA   280 NEXT A
DE   290 PRINT#2,GT(1)
85   300 PRINT#2,GT(2)
84   310 PRINT#2,GT(3)
13   320 CLOSE2
```

PROGRAM: BUDGET CALC

```
E1   100 REM *********************
     ***********
4E   110 REM * BUDGET CALC   BY S
     .PHILLIPS *
ED   120 REM *********************
     ***********
19   130 POKE808,239:REM DISABLES
      RUN/STOP
0A   140 IFLO=1THENGOSUB2920:GOSU
     B2640:GOTO590
C4   150 POKE53280,9:POKE53281,9:
     POKE646,7:PRINTCHR$(142):GOS
     UB160:GOSUB180:GOTO190
91   160 PRINT"[CLR,SPC4]B U D G
     E T[SPC4]P R O G R A M M E":
     PE=1
BF   170 PRINT"[RIGHT4,SE11,RIGHT
     4,SE17]":RETURN
5D   180 PRINT"[DOWN,RIGHT6]WRITT
     EN BY:[SPC3]SIMON PHILLIPS":
     RETURN
B4   190 PRINT"[DOWN4,RIGHT6]PLEA
     SE KEY IN PRESENT MONTH"
13   200 PRINT"[DOWN,RIGHT9]MONTH
     : [C@] [C@] [C@]"
4F   210 QT=16:QU$="":AN$="":FT=0
     :OP=0:PE$="ACTUAL"
63   220 GETQU$:IFQU$=""THEN220
E7   230 PRINT"[UP]"TAB(QT)QU$
C4   240 AN$=AN$+QU$:QT=QT+2:FT=F
     T+1:IFFT=3THEN260
C7   250 GOTO220
3D   260 IFAN$="JAN"THENOP=1
38   270 IFAN$="FEB"THENOP=2
C8   280 IFAN$="MAR"THENOP=3
BA   290 IFAN$="APR"THENOP=4
B7   300 IFAN$="MAY"THENOP=5
```

```
EC  310 IFAN$="JUN"THENOP=6
C1  320 IFAN$="JUL"THENOP=7
7E  330 IFAN$="AUG"THENOP=8
7E  340 IFAN$="SEP"THENOP=9
AE  350 IFAN$="OCT"THENOP=10
3C  360 IFAN$="NOV"THENOP=11
90  370 IFAN$="DEC"THENOP=12
41  380 IFOP=0OROP=13THENAN$="":
    QT=16:FT=0:PRINT"[UP3]":GOTO
    200
BF  390 PRINT"[DOWN4,RIGHT]PRESS
     [RVSON] SPACE BAR [RVSOFF]
    TO COMMENCE LOADING":MZ$=AN$

50  400 GETA$:IFA$=" "THEN420
A6  410 GOTO400
23  420 PRINT"[CLR,DOWN12,RIGHT9
    ]LOADING  BUDGET  DATA"
89  430 OPEN2,8,2,"0:BUDGET DATA
    ,S,R":INPUT#2,SR:INPUT#2,CM:
    AM=0
C0  440 DIMH(200),H$(200),Y(200)
    ,Y$(200),HM(20),HM$(20),YM(2
    0),YM$(20),HS(25)
81  450 DIMHS$(25),YS(25),YS$(25
    ),V(200)
42  460 DIMM$(20),M(20),S$(20),S
    (20),F$(200),F(200),FZ(200),
    FZ$(200),SR$(20),SS$(20)
E9  470 DIMSU$(20),SR(20),SS(20)
    ,SU(20),BA$(30),BB$(30),BC$(
    30),BA(30),BB(30),J$(30)
C6  480 DIMBC(30),ST$(20),MT$(20
    ),MT(20),ST(20),NB(20),NC(20
    ),GT(10),R(99):FORA=1TO192
78  490 INPUT#2,Y$(A):Y$=MID$(Y$
    (A),2):Y(A)=VAL(Y$):NEXTA
BF  500 FORA=1TO192:INPUT#2,H$(A
    ):H$=MID$(H$(A),2):H(A)=VAL(
    H$):NEXTA:GOSUB2920:GOSUB264
    0
E9  510 FORB=1TO12:INPUT#2,SR$(B
    ):SR$=MID$(SR$(B),2):SR(B)=V
    AL(SR$)
16  520 INPUT#2,SS$(B):SS$=MID$(
    SS$(B),2):SS(B)=VAL(SS$)
E2  530 INPUT#2,SU$(B):SU$=MID$(
    SU$(B),2):SU(B)=VAL(SU$)
F2  540 NEXTB:FORC=1TO16
26  550 INPUT#2,BA$(C):BA$=MID$(
    BA$(C),2):BA(C)=VAL(BA$)
E3  560 INPUT#2,BB$(C):BB$=MID$(
    BB$(C),2):BB(C)=VAL(BB$)
60  570 INPUT#2,BC$(C):BC$=MID$(
    BC$(C),2):BC(C)=VAL(BC$)
39  580 NEXTC:INPUT#2,GT(1):INPU
    T#2,GT(2):INPUT#2,GT(3):CLOS
    E2
58  590 SM$="SUB [SM] MONTH[RIGH
    T]":ST$="SUBT":MT$="MONTHLY
    TOT[RIGHT]":MI=12
0C  600 OPEN3,8,3,"0:BUDGET SUBJ
    ECTS,S,R"
2E  610 FORFI=1TO16
AD  620 INPUT#3,J$(FI):S$(FI)=MI
    D$(J$(FI),1,MI):INPUT#3,NB(F
    I):INPUT#3,NC(FI)
09  630 NEXTFI
55  640 CLOSE3
E5  650 GOSUB660:GOTO720
D7  660 FORGH=1TO192
83  670 IFY$(GH)="[RIGHT]000"THE
    NY$(GH)="[RIGHT]---"
E2  680 F$(GH)=Y$(GH):F(GH)=Y(GH
    )
35  690 NEXTGH
81  700 FORGH=1TO16:ST$(GH)=YS$(
    GH):ST(GH)=YS(GH):NEXTGH
5F  710 FORGH=1TO12:MT$(GH)=YM$(
    GH):MT(GH)=YM(GH):NEXTGH:RET
    URN
4E  720 OPEN4,8,4,"0:BUDGET MONT
    HS,S,R"
31  730 FORZZ=1TO12:INPUT#4,M$(Z
    Z):NEXTZZ:CLOSE4
1B  740 IFAN$=MID$(M$(1),2,3)AND
    LO=0THENCM=CM+1:SR=1:GOTO320
    0
AB  750 LA$="":LB$=" ":LC$="  ":
    LD$="  ":LE$="[SPC4]"
BA  760 LF$="[CT39]":LK$="[RIGHT
    ]":PE$=" ACTUAL "
F0  770 GOSUB830:GOSUB780:GOTO82
    0
F6  780 PRINT"[HOME]";
5E  790 FORTY=1TO19:PRINT"[SPC39
    ]":NEXTTY
AD  800 RETURN
1B  810 GOSUB830
F0  820 GOTO860
ED  830 PA$(1)="[RIGHT2,SO,CY6,S
    P,RVSON,SO,CY4,SP,RVSOFF,SO,
    CY5,SP,SO,CY3,SP,SO,CY8,SP]"

DA  840 PA$(2)="[RIGHT2,CH]REVIE
    W[CM,RVSON,CG]MOVE[CM,RVSOFF
    ,CG]AMEND[CM,CG]END[CM,CG]"+
    PE$+"[CM]"
28  850 PA$(3)="[RIGHT2,SL,CP6,S
    @,RVSON,SL,CP4,S@,RVSOFF,SL,
    CP5,S@,SL,CP3,S@,SL,CP8,S@]"
    :RETURN
62  860 GOSUB880
5D  870 GOTO940
C1  880 PRINT"[CLR]"
EB  890 PRINT"[HOME,DOWN20]"
29  900 PRINT"[RIGHT2,SO,CY6,SP,
    RVSON,SO,CY4,SP,RVSOFF,SO,CY
    5,SP,SO,CY3,SP,SO,CY8,SP]"
BB  910 PRINT"[RIGHT2,CH]REVIEW[
    CM,RVSON,CG]MOVE[CM,RVSOFF,C
    G]AMEND[CM,CG]END[CM,CG]"+PE
    $+"[CM]"
82  920 PRINT"[RIGHT2,SL,CP6,S@,
    RVSON,SL,CP4,S@,RVSOFF,SL,CP
    5,S@,SL,CP3,S@,SL,CP8,S@]"
2B  930 RETURN
6D  940 PRINT"[HOME]"
83  950 GOSUB780
0B  960 DI=2:S=1:F=1:U=1:M=1:MT=
    1:FF=F:SS=S:UU=U:MM=M:MU=MT:
    GOTO1260
65  970 F=FF:S=SS:U=UU:M=MM:MT=M
    U
6D  980 SW=1:DI=2
E9  990 AZ$="[RIGHT12]":AX$="[RI
    GHT4]"
F5  1000 DI=2:PRINT"[HOME]";AZ$;
    LB$;M$(M);LA$;M$(M+1);LA$;M$
    (M+2);LA$;M$(M+3);LC$;AX$
24  1010 PRINT"[DOWN]";LF$
CF  1020 PRINT"[DOWN]";AZ$;LB$;F
    $(F);LB$;F$(F+1);LB$;F$(F+2)
    ;LB$;F$(F+3);LC$;AX$
50  1030 PRINT"[DOWN2]";AZ$;LB$;
    F$(F+12);LB$;F$(F+13);LB$;F$
    (F+14);LB$;F$(F+15);LC$;
BA  1040 PRINTAX$
92  1050 PRINT"[DOWN2]";AZ$;LB$;
    F$(F+24);LB$;F$(F+25);LB$;F$
    (F+26);LB$;F$(F+27);LC$;
CE  1060 PRINTAX$
B8  1070 PRINT"[DOWN2]";AZ$;LB$;
    F$(F+36);LB$;F$(F+37);LB$;F$
    (F+38);LB$;F$(F+39);LC$;
E2  1080 PRINTAX$
5A  1090 PRINT"[DOWN3]";AZ$;LA$;
    MT$(MT);LA$;MT$(MT+1);LA$;MT
    $(MT+2);LA$;MT$(MT+3);LD$;
68  1100 PRINTGT$
40  1110 GOTO1390
B6  1120 SW=1:DI=2
02  1130 AC$="[RIGHT5]":AV$="[RI
    GHT5]":AB$="[SPC12]":AS$="[L
    EFT12]"
C3  1140 DI=2:PRINT"[HOME]"
AB  1150 PRINT"[DOWN]";LF$
83  1160 PRINT"[DOWN]";AB$;AS$;S
    $(S);LB$;F$(F);LB$;F$(F+1);L
    B$;F$(F+2);LB$;F$(F+3);LC$;S
    T$(U)
0C  1170 PRINT"[DOWN2]";AB$;AS$;
    S$(S+1);LB$;F$(F+12);LB$;F$(
    F+13);LB$;F$(F+14);LB$;F$(F+
    15);
C5  1180 PRINTLC$;ST$(U+1)
BD  1190 PRINT"[DOWN2]";AB$;AS$;
    S$(S+2);LB$;F$(F+24);LB$;F$(
    F+25);LB$;F$(F+26);LB$;F$(F+
    27);
70  1200 PRINTLC$;ST$(U+2)
9A  1210 PRINT"[DOWN2]";AB$;AS$;
    S$(S+3);LB$;F$(F+36);LB$;F$(
    F+37);LB$;F$(F+38);LB$;F$(F+
    39);
9F  1220 PRINTLC$;ST$(U+3)
58  1230 PRINT"[DOWN3]";AZ$;LA$;
    AC$;LA$;AC$;LA$;AC$;LA$;AC$;
    LD$;
FC  1240 PRINTGT$
FC  1250 GOTO1390
2C  1260 F=FF:S=SS:U=UU:M=MM:MT=
    MU
52  1270 SW=1:DI=2:GOSUB780
48  1280 DI=2:PRINT"[HOME]";SM$;
    LB$;M$(M);LA$;M$(M+1);LA$;M$
    (M+2);LA$;M$(M+3);LC$;ST$
9E  1290 PRINT"[DOWN]";LF$
03  1300 PRINT"[DOWN]";S$(S);LB$
    ;F$(F);LB$;F$(F+1);LB$;F$(F+
    2);LB$;F$(F+3);LC$;ST$(U)
06  1310 PRINT"[DOWN2]";S$(S+1);
    LB$;F$(F+12);LB$;F$(F+13);LB
    $;F$(F+14);LB$;F$(F+15);LC$;

66  1320 PRINTST$(U+1)
C7  1330 PRINT"[DOWN2]";S$(S+2);
    LB$;F$(F+24);LB$;F$(F+25);LB
    $;F$(F+26);LB$;F$(F+27);LC$;

55  1340 PRINTST$(U+2)
BC  1350 PRINT"[DOWN2]";S$(S+3);
    LB$;F$(F+36);LB$;F$(F+37);LB
    $;F$(F+38);LB$;F$(F+39);LC$;

40  1360 PRINTST$(U+3)
65  1370 PRINT"[DOWN3]";MT$;LA$;
    MT$(MT);LA$;MT$(MT+1);LA$;MT
    $(MT+2);LA$;MT$(MT+3);LD$;
87  1380 PRINTGT$
02  1390 SD=NOTPEEK(56320)AND15:
    FO=PEEK(56320)AND16
56  1400 IF(SDAND1)THEN1460
4C  1410 IF(SDAND2)THEN1500
10  1420 IF(SDAND4)THEN1540
B7  1430 IF(SDAND8)THEN1590
07  1440 IFFO=0THEN2100
2A  1450 SD=0:GOTO1390
E5  1460 IFF=1ORF=2ORF=3ORF=4ORF
    =6ORF=7ORF=8THEN1390
5D  1470 IFF=5THEN1390
5B  1480 IFF=9THEN1390
66  1490 F=F-12:S=S-1:U=U-1:GOTO
    1120
B5  1500 IFF=145ORF=146ORF=147OR
    F=148ORF=150ORF=151ORF=152TH
    EN1390
76  1510 IFF=149THEN1390
E9  1520 IFF=153THEN1390
9F  1530 F=F+12:S=S+1:U=U+1:GOTO
    1120
32  1540 IFF=1ORF=13ORF=25ORF=37
    ORF=61ORF=73ORF=85ORF=109ORF
    =121ORF=133THEN1390
D2  1550 IFF=49THEN1390
A9  1560 IFF=97THEN1390
B1  1570 IFF=145THEN1390
80  1580 F=F-1:M=M-1:MT=MT-1:GOT
    O980
```

```
31   1590 IFF=9ORF=21ORF=33ORF=45
     ORF=69ORF=81ORF=93ORF=117ORF
     =129ORF=141THEN1390
05   1600 IFF=57THEN1390
F5   1610 IFF=105THEN1390
3A   1620 IFF=153THEN1390
45   1630 F=F+1:M=M+1:MT=MT+1:GOT
     O980
CD   1640 CE$="":NU=0:CF=0:CG=0:F
     =FF:PRINT"[HOME,DOWN4,RIGHT1
     0,RVSON]"F$(F)"[RVSOFF]":X=0
     :Y=0
3A   1650 FF=F:SS=S:UU=U:MM=M:MU=
     MT
31   1660 SD=NOTPEEK(56320)AND15:
     FO=PEEK(56320)AND16:Y1=Y:X1=
     X
6A   1670 IF(SDAND2)THENY=Y+1:GOT
     O1710
42   1680 IF(SDAND1)THENY=Y-1:GOT
     O1710
6B   1690 IF(SDAND4)THENX=X-1:GOT
     O1710
D2   1700 IF(SDAND8)THENX=X+1:GOT
     O1710
17   1710 IFY<0THENY=0
CF   1720 IFY>3THENY=3
15   1730 IFX<0THENX=0
91   1740 IFX>3THENX=3
6F   1750 IFFO=0THENGOSUB890:GOTO
     1260
27   1760 IFX<>X1THENGOSUB1990
E5   1770 IFY<>Y1THENGOSUB1990
E2   1780 PRINT"[HOME]";:NU=0:FOR
     JA=1TO(Y*3)+4:PRINT"[DOWN]";
     :NEXTJA
AC   1790 PRINTTAB(13+(X*5));
B6   1800 IFY>0THENNU=12*Y
BB   1810 NU=NU+X
C9   1820 PRINT"[RVSON]";F$(F+NU)

E9   1830 GETA$
E3   1840 FO=PEEK(56320)AND16:IFF
     O=0THEN1750
B4   1850 IFA$=""THEN1890
27   1860 IFA$=CHR$(13)THEN1910
42   1870 A=ASC(A$):IFA>57ORA<48T
     HEN1830
5F   1880 GOTO1910
3E   1890 IFCF=0THEN1980
76   1900 GOTO1830
9C   1910 CG=CG+1:IFCG=4THENCP$=C
     E$:CE$="[RIGHT]"+CE$:GOTO201
     0
52   1920 CE$=CE$+A$
60   1930 PRINT"[HOME]";
28   1940 PRINT"[HOME]";:FORJA=1T
     O(Y*3)+4:PRINT"[DOWN]";:NEXT
     JA
0D   1950 PRINTTAB(14+(X*5));"[RV
     SON]";CE$
9E   1960 CF=1:GOTO1830
03   1970 IFFO=0THEN2100
3C   1980 SD=0:GOTO1660
CF   1990 PRINT"[HOME]";:FORJA=1T
     O(Y1*3)+4:PRINT"[DOWN]";:NEX
     TJA
27   2000 PRINTTAB(13+(X1*5));"[R
     VSOFF]";F$(F+NU):RETURN
29   2010 IFA$=CHR$(13)THENCF=0:F
     $(F+NU)=CE$:F(F+NU)=VAL(CP$)
     :AM=1:GOTO2030
ED   2020 GOTO2090
92   2030 PRINT"[HOME,DOWN19,RIGH
     T13]PLEASE WAIT"
8A   2040 IFPE=1THENY$(F+NU)=CE$:
     Y(F+NU)=VAL(CP$)
82   2050 IFPE=0THENH$(F+NU)=CE$:
     H(F+NU)=VAL(CP$)
B3   2060 IFPE=1THENGOSUB2640:GOS
     UB660:GOTO2080
30   2070 IFPE=0THENGOSUB2920:GOS
     UB3590:GOTO2080
27   2080 GOSUB830:GOSUB880:GOTO1
     260
D8   2090 CG=0:CE$="":GOTO1930
6E   2100 FF=F:SS=S:UU=U:MM=M:MU=
     MT
5B   2110 FO=PEEK(56320)AND16:IFF
     O=0THEN2110
62   2120 F=16:SD=NOTPEEK(56320)A
     ND15:FO=PEEK(56320)AND16
80   2130 IF(SDAND1)THEN2110
97   2140 IF(SDAND2)THEN2110
3C   2150 IF(SDAND4)THENDI=DI-1:G
     OTO2190
B7   2160 IF(SDAND8)THENDI=DI+1:G
     OTO2190
93   2170 IFFO=0THEN2530
05   2180 SD=0:GOTO2120
E9   2190 IFDI=0THENDI=5:GOTO2210

D9   2200 IFDI=6THENDI=1
F7   2210 ONDIGOTO2230,2290,2350,
     2410,2470
A0   2220 GOTO2120
BC   2230 PRINT"[HOME,DOWN20]"
3A   2240 PRINT"[RIGHT2,RVSON,SO,
     CY6,SP,RVSOFF,SO,CY4,SP,SO,C
     Y5,SP,SO,CY3,SP,SO,CY8,SP]"
FA   2250 PRINT"[RIGHT2,RVSON,CH]
     REVIEW[CM,RVSOFF,CG]MOVE[CM,
     CG]AMEND[CM,CG]END[CM,CG]";P
     E$;"[CM]"
5F   2260 PRINT"[RIGHT2,RVSON,SL,
     CP6,S@,RVSOFF,SL,CP4,S@,SL,C
     P5,S@,SL,CP3,S@,SL,CP8,S@]"
5D   2270 FORDZ=1TO100:NEXTDZ
FC   2280 GOTO2120
F8   2290 PRINT"[HOME,DOWN20]"
76   2300 PRINT"[RIGHT2,SO,CY6,SP
     ,RVSON,SO,CY4,SP,RVSOFF,SO,C
     Y5,SP,SO,CY3,SP,SO,CY8,SP]"
90   2310 PRINT"[RIGHT2,CH]REVIEW
     [CM,RVSON,CG]MOVE[CM,RVSOFF,
     CG]AMEND[CM,CG]END[CM,CG]";P
     E$;"[CN]"
5C   2320 PRINT"[RIGHT2,SL,CP6,S@
     ,RVSON,SL,CP4,S@,RVSOFF,SL,C
     P5,S@,SL,CP3,S@,SL,CP8,S@]"
08   2330 FORDZ=1TO100:NEXTDZ
29   2340 GOTO2120
79   2350 PRINT"[HOME,DOWN20]"
27   2360 PRINT"[RIGHT2,SO,CY6,SP
     ,SO,CY4,SP,RVSON,SO,CY5,SP,R
     VSOFF,SO,CY3,SP,SO,CY8,SP]"
FE   2370 PRINT"[RIGHT2,CH]REVIEW
     [CM,CG]MOVE[CM,RVSON,CG]AMEN
     D[CM,RVSOFF,CG]END[CM,CG]";P
     E$;"[CN]"
A0   2380 PRINT"[RIGHT2,SL,CP6,S@
     ,SL,CP4,S@,RVSON,SL,CP5,S@,R
     VSOFF,SL,CP3,S@,SL,CP8,S@]"
D4   2390 FORDZ=1TO100:NEXTDZ
65   2400 GOTO2120
95   2410 PRINT"[HOME,DOWN20]"
71   2420 PRINT"[RIGHT2,SO,CY6,SP
     ,SO,CY4,SP,SO,CY5,SP,RVSON,S
     O,CY3,SP,RVSOFF,SO,CY8,SP]"
BE   2430 PRINT"[RIGHT2,CH]REVIEW
     [CM,CG]MOVE[CM,CG]AMEND[CM,R
     VSON,CG]END[CM,RVSOFF,CG]";P
     E$;"[CN]"
10   2440 PRINT"[RIGHT2,SL,CP6,S@
     ,SL,CP4,S@,SL,CP5,S@,RVSON,S
     L,CP3,S@,RVSOFF,SL,CP8,S@]"
20   2450 FORDZ=1TO100:NEXTDZ
91   2460 GOTO2120
81   2470 PRINT"[HOME,DOWN20]"
0D   2480 PRINT"[RIGHT2,SO,CY6,SP
     ,SO,CY4,SP,SO,CY5,SP,SO,CY3,
     SP,RVSON,SO,CY8,SP,RVSOFF]"
DA   2490 PRINT"[RIGHT2,CH]REVIEW
     [CM,CG]MOVE[CM,CG]AMEND[CM,C
     G]END[CM,RVSON,CG]";PE$;"[CN
     ,RVSOFF]"
D8   2500 PRINT"[RIGHT2,SL,CP6,S@
     ,SL,CP4,S@,SL,CP5,S@,SL,CP3,
     S@,RVSON,SL,CP8,S@,RVSOFF]"
6C   2510 FORDZ=1TO100:NEXTDZ
ED   2520 GOTO2120
A9   2530 PRINT"[HOME]"
78   2540 ONDIGOTO3480,2600,1640,
     3470,3500
7F   2550 END
13   2560 GOSUB2640:DI=2:GOTO2350

FE   2570 PRINT"[RIGHT2,CH]REVIEW
     [CM,RVSON,CG]MOVE[CM,RVSOFF,
     CG]AMEND[CM,CG]END[CM,CG]";P
     E$;"[CM]"
03   2580 PRINT"[RIGHT2,SL,CP6,S@
     ,RVSON,SL,CP4,S@,RVSOFF,SL,C
     P5,S@,SL,CP3,S@,SL,CP8,S@]"
28   2590 GOTO2630
7A   2600 PRINT"[CLR]":PRINT"[HOM
     E,DOWN20]"
FE   2610 PRINT"[RIGHT2,SO,CY6,SP
     ,RVSON,SO,CY4,SP,RVSOFF,SO,C
     Y5,SP,SO,CY3,SP,SO,CY8,SP]"
5B   2620 GOTO2570
5E   2630 GOTO1260
A0   2640 FORER=1TO(12*16):IFY$(E
     R)="[RIGHT]000"THENY$(ER)="[
     RIGHT]---":NEXTER
28   2650 FORTY=1TO12
AF   2660 YM(TY)=Y(TY)+Y(TY+12)+Y
     (TY+24)+Y(TY+48)+Y(TY+60)+Y(
     TY+72)+Y(TY+84)+Y(TY+96)
24   2670 YM(TY)=YM(TY)+Y(TY+108)
     +Y(TY+120)+Y(TY+132)+Y(TY+14
     4)+Y(TY+156)+Y(TY+168)
11   2680 YM(TY)=YM(TY)+Y(TY+36)+
     Y(TY+180):YM$(TY)=STR$(YM(TY
     ))
6A   2690 NEXTTY:ZY=0
9B   2700 FORZX=0TO15:ZZ=(ZX*12)+
     1:ZY=ZY+1
CE   2710 YS(ZY)=Y(ZZ)+Y(ZZ+1)+Y(
     ZZ+2)+Y(ZZ+3)+Y(ZZ+4)+Y(ZZ+5
     )+Y(ZZ+6)+Y(ZZ+7)
D4   2720 YS(ZY)=YS(ZY)+Y(ZZ+8)+Y
     (ZZ+9)+Y(ZZ+10)+Y(ZZ+11)
C8   2730 NEXTZX
BA   2740 FORTY=1TO16:YS$(TY)=STR
     $(YS(TY)):NEXTTY
54   2750 GT=YM(1)+YM(2)+YM(3)+YM
     (4)+YM(5)+YM(6)+YM(7)+YM(8)+
     YM(9)+YM(10)+YM(11)
83   2760 GT=GT+YM(12):GT$=STR$(G
     T):GT$=MID$(GT$,2):GT$="[RIG
     HT]"+GT$
9E   2770 FORT=1TO16:YM$(T)=MID$(
     YM$(T),2)
33   2780 IFYM$(T)="0"THENYM$(T)=
     "[RIGHT]0000":GOTO2830
2D   2790 L=LEN(YM$(T)):IFL=3THEN
     YM$(T)="[RIGHT]0"+YM$(T):GOT
     O2830
E8   2800 L=LEN(YM$(T)):IFL=2THEN
     YM$(T)="[RIGHT]00"+YM$(T):GO
     TO2830
9B   2810 L=LEN(YM$(T)):IFL=1THEN
     YM$(T)="[RIGHT]000"+YM$(T):G
     OTO2830
BD   2820 L=LEN(YM$(T)):IFL=4THEN
     YM$(T)="[RIGHT]"+YM$(T):GOTO
     2830
EF   2830 NEXTT
91   2840 FORT=1TO16:YS$(T)=MID$(
     YS$(T),2)
62   2850 IFYS$(T)="0"THENYS$(T)=
     "[RIGHT]0000":GOTO2900
8A   2860 L=LEN(YS$(T)):IFL=3THEN
     YS$(T)="[RIGHT]0"+YS$(T):GOT
     O2900
65   2870 L=LEN(YS$(T)):IFL=2THEN
     YS$(T)="[RIGHT]00"+YS$(T):GO
     TO2900
```

```
80   2880 L=LEN(YS$(T)):IFL=1THEN
     YS$(T)="[RIGHT]000"+YS$(T):G
     OTO2900
8D   2890 L=LEN(YS$(T)):IFL=4THEN
     YS$(T)="[RIGHT]"+YS$(T)
31   2900 NEXTT
E7   2910 RETURN
1B   2920 FORER=1TO(12*16):IFH$(E
     R)="[RIGHT]000"THENH$(ER)="[
     RIGHT]---":NEXTER
51   2930 FORTY=1TO12
05   2940 HM(TY)=H(TY)+H(TY+12)+H
     (TY+24)+H(TY+48)+H(TY+60)+H(
     TY+72)+H(TY+84)+H(TY+96)
5F   2950 HM(TY)=HM(TY)+H(TY+108)
     +H(TY+120)+H(TY+132)+H(TY+14
     4)+H(TY+156)+H(TY+168)
F8   2960 HM(TY)=HM(TY)+H(TY+36)+
     H(TY+180):HM$(TY)=STR$(HM(TY
     ))
1D   2970 NEXTTY:ZY=0
E2   2980 FORZX=0TO15:ZZ=(ZX*12)+
     1:ZY=ZY+1
CE   2990 HS(ZY)=H(ZZ)+H(ZZ+1)+H(
     ZZ+2)+H(ZZ+3)+H(ZZ+4)+H(ZZ+5
     )+H(ZZ+6)+H(ZZ+7)
5F   3000 HS(ZY)=HS(ZY)+H(ZZ+8)+H
     (ZZ+9)+H(ZZ+10)+H(ZZ+11)
F1   3010 NEXTZX
0D   3020 FORTY=1TO16:HS$(TY)=STR
     $(HS(TY)):NEXTTY
A4   3030 GT=HM(1)+HM(2)+HM(3)+HM
     (4)+HM(5)+HM(6)+HM(7)+HM(8)+
     HM(9)+HM(10)+HM(11)
D1   3040 GT=GT+HM(12):GT$=STR$(G
     T):GT$=MID$(GT$,2):GT$="[RIG
     HT]"+GT$:GH$=GT$
9D   3050 FORT=1TO16:HM$(T)=MID$(
     HM$(T),2)
2D   3070 L=LEN(HM$(T)):IFL=3THEN
     HM$(T)="[RIGHT]0"+HM$(T):GOT
     O3110
53   3080 L=LEN(HM$(T)):IFL=2THEN
     HM$(T)="[RIGHT]00"+HM$(T):GO
     TO3110
94   3090 L=LEN(HM$(T)):IFL=1THEN
     HM$(T)="[RIGHT]000"+HM$(T):G
     OTO3110
6D   3100 L=LEN(HM$(T)):IFL=4THEN
     HM$(T)="[RIGHT]"+HM$(T):GOTO
     3110
04   3110 NEXTT
26   3120 FORT=1TO16:HS$(T)=MID$(
     HS$(T),2)
BE   3130 IFHS$(T)="0"THENHS$(T)=
     "[RIGHT]0000":GOTO3180
79   3140 L=LEN(HS$(T)):IFL=3THEN
     HS$(T)="[RIGHT]0"+HS$(T):GOT
     O3180
7E   3150 L=LEN(HS$(T)):IFL=2THEN
     HS$(T)="[RIGHT]00"+HS$(T):GO
     TO3180
47   3160 L=LEN(HS$(T)):IFL=1THEN
     HS$(T)="[RIGHT]000"+HS$(T):G
     OTO3180
45   3170 L=LEN(HS$(T)):IFL=4THEN
     HS$(T)="[RIGHT]"+HS$(T)
4E   3180 NEXTT
0C   3190 RETURN
C9   3200 FORW=1TO193:Y(W)=0:H(W)
     =0:H$(W)="[RIGHT]---":Y$(W)=
     "[RIGHT]---":NEXTW
D7   3210 FORGH=1TO192
AD   3220 H(GH)=0:IFH(GH)>0THENH(
     GH)=0
DF   3230 Y(GH)=0:IFY(GH)>0THENY(
     GH)=0:NEXTGH
8B   3240 FORE=1TO16
3D   3250 IFST(E)>0THENST(E)=0
85   3260 ST$(E)="[RIGHT]0000":NE
     XTE
```

```
D4   3270 GT(1)=GT(2):GT$(1)=GT$(
     2)
52   3280 GT(2)=GT(3):GT$(2)=GT$(
     3)
C8   3290 GT(3)=GT:GT$(3)=GT$
38   3300 FORGH=1TO12
43   3310 YM$(GH)="[RIGHT]0000":I
     FYM$(GH)<>"[RIGHT]0000"THENY
     M$(GH)="[RIGHT]0000"
7C   3320 HM$(GH)="[RIGHT]0000":I
     FHM$(GH)<>"[RIGHT]0000"THENH
     M$(GH)="[RIGHT]0000"
9C   3330 NEXTGH
42   3340 GT=0:GT$="[RIGHT]0000"
30   3350 FORP=1TO16
67   3360 YS$(P)="[RIGHT]0000"
9C   3370 HS$(P)="[RIGHT]0000"
EC   3380 YS(P)=0000
19   3390 HS(P)=0000
E4   3400 NEXTP:SR=0
C6   3410 FORP=1TO12:HM(P)=0000:H
     M$(P)="[RIGHT]0000":YM(P)=0:
     YM$(P)="[RIGHT]0000":NEXTP
55   3420 F=ZQ(1):S=ZQ(2):T=ZQ(3)
     :M=ZQ(4):MT=ZQ(5)
E0   3430 FORTU=1TO193:F$(TU)=Y$(
     TU):F(TU)=Y(TU):NEXTTU
E6   3440 FORTU=1TO16:ST$(TU)=YS$
     (TU):ST(TU)=YS(TU):NEXTTU
24   3450 FORTU=1TO12:MT$(TU)=YM$
     (TU):MT(TU)=YM(TU):NEXTTU
AA   3460 GOTO750
75   3470 PRINT"[HOME,DOWN19,RIGH
     T13]PLEASE WAIT":GOSUB3650:L
     OAD"BUD END",8,1
D7   3480 PRINT"[HOME,DOWN19,RIGH
     T13]PLEASE WAIT":GOSUB3650
EE   3490 LOAD"BUD REVIEW",8,1
16   3500 PRINT"[HOME,DOWN19,RIGH
     T13]PLEASE WAIT"
19   3510 IFPE=0THENPE=1:PE$=" AC
     TUAL ":GOSUB2640:GOTO3560
D7   3520 IFPE=1THENPE=0:PE$="EST
     IMATE":GOSUB2920
12   3530 FORTU=1TO193:F$(TU)=H$(
     TU):F(TU)=H(TU):NEXTTU
A0   3540 FORTU=1TO16:ST$(TU)=HS$
     (TU):ST(TU)=HS(TU):NEXTTU
9D   3550 FORTU=1TO12:MT$(TU)=HM$
     (TU):MT(TU)=HM(TU):NEXTTU:GO
     TO2600
56   3560 FORTU=1TO193:F$(TU)=Y$(
     TU):F(TU)=Y(TU):NEXTTU
04   3570 FORTU=1TO16:ST$(TU)=YS$
     (TU):ST(TU)=YS(TU):NEXTTU
BD   3580 FORTU=1TO12:MT$(TU)=YM$
     (TU):MT(TU)=YM(TU):NEXTTU:GO
51   3590 FORGH=1TO192
19   3600 IFH$(GH)="[RIGHT]000"TH
     ENH$(GH)="[RIGHT]---"
70   3610 F$(GH)=H$(GH):F(GH)=H(G
     H)
BF   3620 NEXTGH
BB   3630 FORGH=1TO12:ST$(GH)=HS$
     (GH):ST(GH)=HS(GH):NEXTGH
05   3640 FORGH=1TO16:MT$(GH)=HM$
     (GH):MT(GH)=HM(GH):NEXTGH:RE
     TURN
FC   3650 GT=YM(1)+YM(2)+YM(3)+YM
     (4)+YM(5)+YM(6)+YM(7)+YM(8)+
     YM(9)+YM(10)+YM(11)
EB   3660 GT=GT+YM(12):GT$=STR$(G
     T):GT$=MID$(GT$,2):GT$="[RIG
     HT]"+GT$
E4   3670 OPEN2,8,2,"@0:BUDGET DA
     TA 2,S,W"
FB   3680 FORTY=1TO192
C1   3690 PRINT#2,Y$(TY)
E5   3700 PRINT#2,Y(TY)
3B   3710 NEXTTY
B3   3720 FORTY=1TO192
F6   3730 PRINT#2,H$(TY)
```

```
7E   3740 PRINT#2,H(TY)
D3   3750 NEXTTY
13   3760 PRINT#2,GT$
0C   3770 FORTY=1TO12
56   3780 PRINT#2,YM$(TY)
E2   3790 PRINT#2,YM(TY)
E1   3800 NEXTTY
44   3810 FORTY=1TO12
1D   3820 PRINT#2,HM$(TY)
1D   3830 PRINT#2,HM(TY)
B8   3840 NEXTTY
01   3850 FORTY=1TO16
E9   3860 PRINT#2,YS$(TY)
0D   3870 PRINT#2,YS(TY)
50   3880 NEXTTY
79   3890 FORTY=1TO16
C4   3900 PRINT#2,HS$(TY)
54   3910 PRINT#2,HS(TY)
34   3920 NEXTTY:CLOSE2
E7   3930 RETURN
```

PROGRAM: BUDGET REVIEW

```
48   100 GOTO380
87   110 OPEN2,8,2,"0:BUDGET DATA
     2,S,R"
D1   120 FORTY=1TO192
57   130 INPUT#2,Y$(TY)
EB   140 INPUT#2,Y(TY)
31   150 NEXTTY
E9   160 FORTY=1TO192
CC   170 INPUT#2,H$(TY)
74   180 INPUT#2,H(TY)
C9   190 NEXTTY
F1   200 INPUT#2,GT$
46   210 FORTY=1TO12
34   220 INPUT#2,YM$(TY)
00   230 INPUT#2,YM(TY)
9F   240 NEXTTY
5E   250 FORTY=1TO12
8C   260 INPUT#2,HM$(TY)
68   270 INPUT#2,HM(TY)
B6   280 NEXTTY
FB   290 FORTY=1TO16
63   300 INPUT#2,YS$(TY)
0F   310 INPUT#2,YS(TY)
4E   320 NEXTTY
93   330 FORTY=1TO16
16   340 INPUT#2,HS$(TY)
A6   350 INPUT#2,HS(TY)
32   360 NEXTTY:CLOSE2
FD   370 RETURN
8B   380 IFAM$=MID$(MT$(1),2,3)AN
     DAM=0THEN400
DE   390 GOSUB110:GOTO520
82   400 FORP=1TO16:YS$(P)="[RIGH
     T]0000":NEXTP
6A   410 FORP=1TO12:YM$(P)="[RIGH
     T]0000":NEXTP
21   420 FORER=1TO(12*16):IFY$(ER
     )="[RIGHT]000"THENY$(ER)="[R
     IGHT]---":NEXTER
87   430 FORTY=1TO16
81   440 SR$(TY)=SS(TY):SR$(TY)=S
     S$(TY)
FB   450 SS$(TY)=SU(TY):SS$(TY)=S
     U$(TY)
9D   460 SU$(TY)=ST(TY):SU$(TY)=S
     T$(TY)
6E   470 NEXTTY:FORTY=1TO12
6F   480 BA(TY)=BB(TY):BA$(TY)=BB
     $(TY)
3B   490 BB(TY)=BC(TY):BB$(TY)=BC
     $(TY)
09   500 BC(TY)=MT(TY):BC$(TY)=MT
     $(TY)
8D   510 NEXTTY:AM$="+"
```

```
61  520 LA$="":LB$=" ":LC$="  ":
    LD$="[SPC3]":LE$="[SPC4]"
DA  530 LF$="[CT40]":LK$="[RIGHT
    ]"
E2  540 FORTY=1TO16:ST$(TY)=YS$(
    TY):NEXTTY
28  550 FORTY=1TO12:MT$(TY)=YM$(
    TY):NEXTTY
D7  560 IFFR=1THENLO=1:LOAD"BUDG
    ET CALC",8,1
F7  570 PRINT"[CLR,RIGHT12]REVIE
    W FIGURES[DOWN,LEFT14,CT6] [
    CT7]"
4F  580 PRINT"[DOWN3,RIGHT35,C@4
    ]"
ED  590 PRINT"REVIEW SUBJECTS...
    ..................[RVSON] F1
    [RVSOFF]"
1B  600 PRINT"[DOWN,RIGHT35,C@4]
    "
9D  610 PRINT"REVIEW MONTHS.....
    ..................[RVSON] F3
    [RVSOFF]"
F7  620 PRINT"[DOWN,RIGHT35,C@4]
    "
E5  630 PRINT"REVIEW TOTALS GRAP
    HICALLY..........[RVSON] F5
    [RVSOFF]"
A3  640 PRINT"[DOWN,RIGHT35,C@4]
    "
58  650 PRINT"REVIEW PROFIT OR L
    OSS..............[RVSON] F7
    [RVSOFF]"
80  660 PRINT"[DOWN,RIGHT29,C@11
    ]";
3A  670 PRINT"RETURN TO THE SPRE
    ADSHEET....[RVSON] SPACE BAR
     [RVSOFF]"
54  680 PRINT"[DOWN3,RIGHT3]WHAT
     IS YOUR OPTION ?"
C4  690 GETQU$:IFQU$=""THEN690
9B  700 IFQU$="[F1]"ORQU$="[F3]"
    ORQU$="[F5]"ORQU$="[F7]"ORQU
    $=" "THEN720
7E  710 GOTO690
67  720 PRINT"[UP,SPC13]PLEASE W
    AIT"
45  730 IFQU$="[F1]"THEN790
45  740 IFQU$="[F3]"THEN1190
87  750 IFQU$="[F5]"THEN1520
ED  760 IFQU$="[F7]"THEN2810
87  770 IFQU$=" "THENLO=1:LOAD"B
    UDGET CALC",8,1
B5  780 GOTO690
E4  790 PRINT"[CLR,RIGHT12]REVIE
    W FIGURES[DOWN,LEFT14,CT6] [
    CT7]"
BE  800 PRINT"[DOWN,RIGHT12]";CM
    ;LB$;CM+1;LB$;CM+2;LB$;CM+3
E9  810 PRINT"[DOWN]"
F0  820 PRINTS$(1);LA$;BA$(1);LC
    $;BB$(1);LC$;BC$(1);LC$;YS$(
    1):PRINT
C3  830 PRINTS$(2);LA$;BA$(2);LC
    $;BB$(2);LC$;BC$(2);LC$;YS$(
    2):PRINT
D6  840 PRINTS$(3);LA$;BA$(3);LC
    $;BB$(3);LC$;BC$(3);LC$;YS$(
    3):PRINT
29  850 PRINTS$(4);LA$;BA$(4);LC
    $;BB$(4);LC$;BC$(4);LC$;YS$(
    4):PRINT
2C  860 PRINTS$(5);LA$;BA$(5);LC
    $;BB$(5);LC$;BC$(5);LC$;YS$(
    5):PRINT
7F  870 PRINTS$(6);LA$;BA$(6);LC
    $;BB$(6);LC$;BC$(6);LC$;YS$(
    6):PRINT
3A  880 PRINTS$(7);LA$;BA$(7);LC
    $;BB$(7);LC$;BC$(7);LC$;YS$(
    7):PRINT
15  890 PRINTS$(8);LA$;BA$(8);LC
    $;BB$(8);LC$;BC$(8);LC$;YS$(
    8):PRINT
D3  900 PRINT"[DOWN]  USE JOYSTI
    CK TO VIEW OTHER SUBJECTS"
5B  910 PRINT"[HOME]"
42  920 FO=16:SD=NOTPEEK(56320)A
    ND15:FO=PEEK(56320)AND16
3E  930 IF(SDAND1)THEN920
B0  940 IF(SDAND2)THEN990
21  950 IF(SDAND4)THEN920
2B  960 IF(SDAND8)THEN920
20  970 IFFO=0THEN570
62  980 SD=0:GOTO920
DC  990 PRINT"[CLR,RIGHT12]REVIE
    W FIGURES[DOWN,LEFT14,CT6] [
    CT7]"
66  1000 PRINT"[DOWN,RIGHT12]";C
    M;LB$;CM+1;LB$;CM+2;LB$;CM+3
C1  1010 PRINT"[DOWN]"
20  1020 PRINTS$(9);LA$;BA$(9);L
    C$;BB$(9);LC$;BC$(9);LC$;YS$
    (9):PRINT
E3  1030 PRINTS$(10);LA$;BA$(10)
    ;LC$;BB$(10);LC$;BC$(10);LC$
    ;YS$(10):PRINT
6A  1040 PRINTS$(11);LA$;BA$(11)
    ;LC$;BB$(11);LC$;BC$(11);LC$
    ;YS$(11):PRINT
91  1050 PRINTS$(12);LA$;BA$(12)
    ;LC$;BB$(12);LC$;BC$(12);LC$
    ;YS$(12):PRINT
88  1060 PRINTS$(13);LA$;BA$(13)
    ;LC$;BB$(13);LC$;BC$(13);LC$
    ;YS$(13):PRINT
5F  1070 PRINTS$(14);LA$;BA$(14)
    ;LC$;BB$(14);LC$;BC$(14);LC$
    ;YS$(14):PRINT
96  1080 PRINTS$(15);LA$;BA$(15)
    ;LC$;BB$(15);LC$;BC$(15);LC$
    ;YS$(15):PRINT
1D  1090 PRINTS$(16);LA$;BA$(16)
    ;LC$;BB$(16);LC$;BC$(16);LC$
    ;YS$(16):PRINT
60  1100 PRINT"[DOWN]  USE JOYST
    ICK TO VIEW OTHER SUBJECTS"
18  1110 PRINT"[HOME]"
BE  1120 F=16:SD=NOTPEEK(56320)A
    ND15:FO=PEEK(56320)AND16
F2  1130 IF(SDAND1)THEN790
A1  1140 IF(SDAND2)THEN1120
B9  1150 IF(SDAND4)THEN1120
37  1160 IF(SDAND8)THEN1120
E7  1170 IFFO=0THEN570
98  1180 SD=0:GOTO1120
19  1190 PRINT"[CLR,RIGHT12]REVI
    EW FIGURES[DOWN,LEFT14,CT6]
    [CT7]"
2E  1200 PRINT"[DOWN2,RIGHT12]";
    CM;LB$;CM+1;LB$;CM+2;LB$;CM+
    3
4B  1210 PRINT"[DOWN2]"
19  1220 PRINTM$(1);"[RIGHT7]";L
    A$;SR$(1);LC$;SS$(1);LC$;SU$
    (1);LC$;YM$(1)
92  1230 PRINT"[DOWN]";M$(2);"[R
    IGHT7]";LA$;SR$(2);LC$;SS$(2
    );LC$;SU$(2);LC$;YM$(2)
01  1240 PRINT"[DOWN]";M$(3);"[R
    IGHT7]";LA$;SR$(3);LC$;SS$(3
    );LC$;SU$(3);LC$;YM$(3)
B8  1250 PRINT"[DOWN]";M$(4);"[R
    IGHT7]";LA$;SR$(4);LC$;SS$(4
    );LC$;SU$(4);LC$;YM$(4)
23  1260 PRINT"[DOWN]";M$(5);"[R
    IGHT7]";LA$;SR$(5);LC$;SS$(5
    );LC$;SU$(5);LC$;YM$(5)
F6  1270 PRINT"[DOWN]";M$(6);"[R
    IGHT7]";LA$;SR$(6);LC$;SS$(6
    );LC$;SU$(6);LC$;YM$(6)
E9  1280 PRINT"[DOWN3] USE JOYST
    ICK TO VIEW FOLLOWING MONTHS
    ":FORTY=1TO100:GETTU$:NEXTTY
3E  1290 FO=16:SD=NOTPEEK(56320)
    AND15:FO=PEEK(56320)AND16
CB  1300 IF(SDAND1)THEN1290
D8  1310 IF(SDAND2)THEN1360
DC  1320 IF(SDAND4)THEN1290
C6  1330 IF(SDAND8)THEN1290
04  1340 IFFO=0THEN570
27  1350 SD=0:GOTO1290
98  1360 PRINT"[CLR,RIGHT12]REVI
    EW FIGURES[DOWN,LEFT14,CT6]
    [CT7]"
5F  1370 PRINT"[DOWN2,RIGHT12]";
    CM;LB$;CM+1;LB$;CM+2;LB$;CM+
    3:PRINT"[DOWN]"
5A  1380 PRINT"[DOWN]";M$(7);"[R
    IGHT7]";LA$;SR$(7);LC$;SS$(7
    );LC$;SU$(7);LC$;YM$(7)
7F  1390 PRINT"[DOWN]";M$(8);"[R
    IGHT7]";LA$;SR$(8);LC$;SS$(8
    );LC$;SU$(8);LC$;YM$(8)
14  1400 PRINT"[DOWN]";M$(9);"[R
    IGHT7]";LA$;SR$(9);LC$;SS$(9
    );LC$;SU$(9);LC$;YM$(9)
6E  1410 PRINT"[DOWN]";M$(10);"[
    RIGHT7]";LA$;SR$(10);LC$;SS$
    (10);LC$;SU$(10);LC$;YM$(10)
24  1420 PRINT"[DOWN3]";M$(12);"
    [RIGHT7]";LA$;SR$(12);LC$;SS
    $(12);LC$;SU$(12);LC$;YM$(12
    )
26  1430 PRINT"[DOWN3] USE JOYST
    ICK TO VIEW FOLLOWING MONTHS
    "
D3  1440 PRINT"[UP7]";M$(11);"[R
    IGHT7]";LA$;SR$(11);LC$;SS$(
    11);LC$;SU$(11);LC$;YM$(11)
5E  1450 FO=16:SD=NOTPEEK(56320)
    AND15:FO=PEEK(56320)AND16
68  1460 IF(SDAND1)THEN1190
7A  1470 IF(SDAND2)THEN1450
F2  1480 IF(SDAND4)THEN1450
D4  1490 IF(SDAND8)THEN1450
64  1500 IFFO=0THEN570
35  1510 SD=0:GOTO1450
69  1520 PRINT"[CLR,RIGHT5]REVIE
    W FIGURES[DOWN,LEFT14,CT6] [
    CT7]"
8A  1530 IFGT>4000THEN2160
5F  1540 IFGT(1)>4000THEN2160
4C  1550 IFGT(2)>4000THEN2160
CD  1560 IFGT(3)>4000THEN2160
8E  1570 PRINT"[DOWN4,RIGHT6]";L
    A$;CM;LB$;CM+1;LB$;CM+2;LB$;
    CM+3
D2  1580 PRINT"[RIGHT]4000 [C@27
    ] "
6B  1590 PRINT"[RIGHT5,CM,SPC6,S
    -,SPC6,S-,SPC6,S-,SPC6,CG]"
A9  1600 PRINT"[RIGHT5,CM,SPC6,S
    -,SPC6,S-,SPC6,S-,SPC6,CG]"
87  1610 PRINT"[RIGHT5,CM,SPC6,S
    -,SPC6,S-,SPC6,S-,SPC6,CG]"
04  1620 PRINT"[RIGHT]3000[CM,C@
    6,S-,C@6,S-,C@6,S-,C@6,CG]"
93  1630 PRINT"[RIGHT5,CM,SPC6,S
    -,SPC6,S-,SPC6,S-,SPC6,CG]"
D1  1640 PRINT"[RIGHT5,CM,SPC6,S
AF  1650 PRINT"[RIGHT5,CM,SPC6,S
    -,SPC6,S-,SPC6,S-,SPC6,CG]"
F3  1660 PRINT"[RIGHT]2000[CM,C@
    6,S-,C@6,S-,C@6,S-,C@6,CG]"
BB  1670 PRINT"[RIGHT5,CM,SPC6,S
    -,SPC6,S-,SPC6,S-,SPC6,CG]"
B9  1680 PRINT"[RIGHT5,CM,SPC6,S
    -,SPC6,S-,SPC6,S-,SPC6,CG]"
17  1690 PRINT"[RIGHT5,CM,SPC6,S
    -,SPC6,S-,SPC6,S-,SPC6,CG]"
DE  1700 PRINT"[RIGHT]1000[CM,C@
    6,S-,C@6,S-,C@6,S-,C@6,CG]"
63  1710 PRINT"[RIGHT5,CM,SPC6,S
    -,SPC6,S-,SPC6,S-,SPC6,CG]"
61  1720 PRINT"[RIGHT5,CM,SPC6,S
    -,SPC6,S-,SPC6,S-,SPC6,CG]"
FF  1730 PRINT"[RIGHT5,CM,SPC6,S
```

```
        -,SPC6,S-,SPC6,S-,SPC6,CG]"
2D    1740 PRINT"[RIGHT,SPC3]0[CM,
      C@6,S-,C@6,S-,C@6,S-,C@6,CG]
      "
F1    1750 GI=1:GH=7:GOSUB1790
48    1760 GI=2:GH=14:GOSUB1790
87    1770 GI=3:GH=21:GOSUB1790
E2    1780 GT$=STR$(GT):LE$=LEFT$(
      GT$,2):GT$(4)=GT$:GI=4:GH=28
      :GOSUB1830:GOTO2040
1F    1790 GT(4)=GT
3E    1800 FORA=1TO4
50    1810 GT$(A)=STR$(GT(A))
E2    1820 NEXTA
D3    1830 LE$=LEFT$(GT$(GI),2)
B8    1840 PRINT"[HOME,DOWN23]"TAB
      (GH);
64    1850 LE=VAL(LE$):IFLE=0THEN1
      900
81    1860 FORDE=1TOLE
85    1870 PRINT"[RVSON,SPC4,UP,LE
      FT4,SPC4,UP,LEFT4]";
87    1880 PRINT"[RVSON,SPC4,UP,LE
      FT4,SPC4,UP,LEFT4]";
6A    1890 NEXTDE
23    1900 LE$=MID$(GT$(GI),3,1)
71    1910 LE=VAL(LE$):IFLE=0THEN1
      990
4C    1920 IFLE=1THENPRINT"[RVSOFF
      ,CO4]":GOTO1990
73    1930 IFLE=2THENPRINT"[RVSON,
      CY4]":GOTO1990
AB    1940 IFLE=3THENPRINT"[RVSON,
      SPC4,UP,LEFT4,RVSOFF,CP4,RVS
      OFF]":GOTO1990
96    1950 IFLE=4THENPRINT"[RVSON,
      SPC4,UP,LEFT4,RVSON,CY4,RVSO
      FF]":GOTO1990
69    1960 IFLE=5THENPRINT"[RVSON,
      SPC4,UP,LEFT4,RVSON,SPC4,RVS
      OFF]":GOTO1990
47    1970 IFLE=6THENPRINT"[RVSON,
      SPC4,UP,LEFT4,RVSON,SPC4,RVS
      OFF,UP,LEFT4,RVSOFF,CO4]":GO
      TO1990
4C    1980 GOTO2000
43    1990 RETURN
74    2000 IFLE=7THENPRINT"[RVSON,
      SPC4,UP,LEFT4,RVSON,SPC4,RVS
      OFF,UP,LEFT4,RVSON,CY4]":GOT
      O1990
1E    2010 IFLE=8THENPRINT"[RVSON,
      SPC4,UP,LEFT4,RVSON,SPC4,RVS
      OFF,UP,LEFT4,RVSON,SPC4,RVSO
      FF,UP,LEFT4,RVSOFF,CO4]":GOT
      O1990
7F    2020 IFLE=9THENPRINT"[RVSON,
      SPC4,UP,LEFT4,RVSON,SPC4,RVS
      OFF,UP,LEFT4,RVSON,SPC4,RVSO
      FF,UP,LEFT4,RVSON,CY4]":GOTO
      1990
FD    2030 GOTO1990
00    2040 PRINT"[HOME,RIGHT21,RVS
      OFF]:-  [RVSON]GRAND TOTALS[
      RVSOFF]"
60    2050 PRINT"[HOME,DOWN23,RIGH
      T6]";
DC    2060 PRINT"[RVSON]"GT(1)
23    2070 PRINT"[HOME,DOWN23,RIGH
      T13]";
6A    2080 PRINT"[RVSON]";GT(2)
E8    2090 PRINT"[HOME,DOWN23,RIGH
      T20]";
B5    2100 PRINT"[RVSON]";GT(3)
73    2110 PRINT"[HOME,DOWN23,RIGH
      T27]";
33    2120 PRINT"[RVSON]";GT
9C    2130 PRINT"[HOME,DOWN23,RIGH
      T6] [RIGHT4] [RIGHT] [RIGHT4
      ] [RIGHT] [RIGHT4] [RIGHT] [
      RIGHT4] "
C2    2140 PRINT"[HOME]":GT$=MID$(
      GT$,2):GT$="[RIGHT]"+GT$
52    2150 GOTO2740
62    2160 PRINT"[CLR,RIGHT5]REVIE
      W FIGURES[DOWN,LEFT14,CT6] [
      CT7]"
AC    2170 PRINT"[RIGHT6]";LA$;CM;
      LB$;CM+1;LB$;CM+2;LB$;CM+3
54    2180 PRINT"[RIGHT]9999 [C@27
      ] "
B9    2190 PRINT"[RIGHT5,CM,SPC6,S
      -,SPC6,S-,SPC6,S-,SPC6,CG]"
17    2200 PRINT"[RIGHT5,CM,SPC6,S
      -,SPC6,S-,SPC6,S-,SPC6,CG]"
15    2210 PRINT"[RIGHT5,CM,SPC6,S
      -,SPC6,S-,SPC6,S-,SPC6,CG]"
EB    2220 PRINT"[RIGHT]8000[CM,C@
      6,S-,C@6,S-,C@6,S-,C@6,CG]"
61    2230 PRINT"[RIGHT5,CM,SPC6,S
      -,SPC6,S-,SPC6,S-,SPC6,CG]"
FF    2240 PRINT"[RIGHT5,CM,SPC6,S
      -,SPC6,S-,SPC6,S-,SPC6,CG]"
FD    2250 PRINT"[RIGHT5,CM,SPC6,S
      -,SPC6,S-,SPC6,S-,SPC6,CG]"
0D    2260 PRINT"[RIGHT]6000[CM,C@
      6,S-,C@6,S-,C@6,S-,C@6,CG]"
89    2270 PRINT"[RIGHT5,CM,SPC6,S
      -,SPC6,S-,SPC6,S-,SPC6,CG]"
67    2280 PRINT"[RIGHT5,CM,SPC6,S
      -,SPC6,S-,SPC6,S-,SPC6,CG]"
65    2290 PRINT"[RIGHT5,CM,SPC6,S
      -,SPC6,S-,SPC6,S-,SPC6,CG]"
77    2300 PRINT"[RIGHT]4000[CM,C@
      6,S-,C@6,S-,C@6,S-,C@6,CG]"
36    2310 PRINT"[RIGHT5,CM,SPC6,S
      -,SPC6,S-,SPC6,S-,SPC6,CG]"
4C    2320 PRINT"[RIGHT5,CM,SPC6,S
      -,SPC6,S-,SPC6,S-,SPC6,CG]"
92    2330 PRINT"[RIGHT5,CM,SPC6,S
      -,SPC6,S-,SPC6,S-,SPC6,CG]"
A2    2340 PRINT"[RIGHT]2000[CM,C@
      6,S-,C@6,S-,C@6,S-,C@6,CG]"
22    2350 PRINT"[RIGHT,SPC4,CM,SP
      C6,S-,SPC6,S-,SSPC,SPC5,S-,S
      PC6,CG]"
2B    2360 PRINT"[SPC5,CM,SPC6,S-,
      SPC6,S-,SPC6,S-,SPC6,CG]"
21    2370 PRINT"[SPC5,CM,SPC6,S-,
      SPC6,S-,SSPC,SPC5,S-,SPC6,CG
      ]"
2F    2380 PRINT"[SPC4]0[CM,SPC6,S
      -,SPC6,S-,SPC6,S-,SPC6,CG]"
20    2390 GI=1:GH=7:GOSUB2420:GI=
      2:GH=14:GOSUB2420:GI=3:GH=21
      :GOSUB2420
9F    2400 GT$=STR$(GT):LE$=LEFT$(
      GT$,2)
CB    2410 GT$(4)=GT$:GI=4:GH=28:G
      OSUB2430:GOTO2630
B1    2420 GT(4)=GT:FORA=1TO4:GT$(
      A)=STR$(GT(A)):NEXTA
E1    2430 LE$=LEFT$(GT$(GI),2)
5E    2440 PRINT"[HOME,DOWN23]"TAB
      (GH);
53    2450 LE=VAL(LE$):IFLE=0THEN2
      490
23    2460 FORDE=1TOLE
AF    2470 PRINT"[RVSON,SPC4,RVSOF
      F,UP,LEFT4,RVSON,SPC4,RVSOFF
      ,UP,LEFT4]";
3A    2480 NEXTDE
B3    2490 LE$=MID$(GT$(GI),3,1)
49    2500 LE=VAL(LE$):IFLE=0THEN2
      580
78    2510 IFLE=1THENPRINT"[CO4]":
      GOTO2580
AB    2520 IFLE=2THENPRINT"[CI4]":
      GOTO2580
1E    2530 IFLE=3THENPRINT"[RVSON,
      CU4,RVSOFF]":GOTO2580
B5    2540 IFLE=4THENPRINT"[RVSON,
      CY4,RVSOFF]":GOTO2580
28    2550 IFLE=5THENPRINT"[RVSON,
      CT4,RVSOFF]":GOTO2580
8A    2560 IFLE=6THENPRINT"[RVSON,
      SPC4,RVSOFF]":GOTO2580
03    2570 GOTO2590
90    2580 RETURN
86    2590 IFLE=7THENPRINT"[RVSON,
      SPC4,UP,LEFT4,RVSOFF,C@4]":G
      OTO2580
9F    2600 IFLE=8THENPRINT"[RVSON,
      SPC4,UP,LEFT4,RVSOFF,CP4]":G
      OTO2580
BC    2610 IFLE=9THENPRINT"[RVSON,
      SPC4,UP,LEFT4,RVSOFF,CO4]":G
      OTO2580
5C    2620 GOTO2580
0B    2630 PRINT"[HOME,RIGHT21,RVS
      OFF]:-  [RVSON]GRAND TOTALS[
      RVSOFF]"
30    2640 PRINT"[HOME,DOWN23,RIGH
      T6]";
EC    2650 PRINT"[RVSON]"GT(1)
D3    2660 PRINT"[HOME,DOWN23,RIGH
      T13]";
9A    2670 PRINT"[RVSON]";GT(2)
58    2680 PRINT"[HOME,DOWN23,RIGH
      T20]";
B5    2690 PRINT"[RVSON]";GT(3)
C3    2700 PRINT"[HOME,DOWN23,RIGH
      T27]";
C3    2710 PRINT"[RVSON]";GT
6C    2720 PRINT"[HOME,DOWN23,RIGH
      T6] [RIGHT4] [RIGHT] [RIGHT4
      ] [RIGHT] [RIGHT4] [RIGHT] [
      RIGHT4] "
52    2730 PRINT"[HOME]":GT$=MID$(
      GT$,2):GT$="[RIGHT]"+GT$
87    2740 FO=16:SD=NOTPEEK(56320)
      AND15:FO=PEEK(56320)AND16
59    2750 IF(SDAND1)THEN2740
D6    2760 IF(SDAND2)THEN2740
6E    2770 IF(SDAND4)THEN2740
04    2780 IF(SDAND8)THEN2740
69    2790 IFFO=0THEN570
A7    2800 SD=0:GOTO2740
EF    2810 PRINT"[CLR,RIGHT12]REVI
      EW FIGURES[DOWN,LEFT14,CT6]
      [CT7]"
68    2820 FORUI=1TO12:A$=LEFT$(M$
      (UI),2)
8D    2830 PRINTTAB(11+UI);A$;:NEX
      TUI:PRINT"[SPC4]";
0F    2840 FORAF=1TO16:PRINTS$(AF)
      ;"[SO,CY,SO,CY,SO,CY,SO,CY,S
      O,CY,SO,CY,SO,CY,SO,CY,SO,CY
      ,SO,CY,SO,CY,SO,SP] [SO,SP]"
      :NEXTAF
1F    2850 PRINTTAB(12)"[CY24] [CY
      2]"
CE    2860 PRINTTAB(12);"[SO,CY,SO
      ,CY,SO,CY,SO,CY,SO,CY,SO,CY,
      SO,CY,SO,CY,SO,CY,SO,CY,SO,C
      Y,SO,SP] [SO,SP]"
DB    2870 PRINTTAB(12)"[CY24] [CY
      2]"
9D    2880 PRINT"[RED,RVSON] [RVSO
      FF,YELLOW]=LOSS  (ACTUAL IS
      MORE THAN ESTIMATED)"
2E    2890 PRINT"[GREEN,RVSON] [RV
      SOFF,YELLOW]=PROFIT(ACTUAL I
      S LESS THAN ESTIMATED)"
A6    2900 FORW=1TO192
55    2910 V(W)=H(W)-Y(W):IFV(W)>0
      THENV(W)=1:GOTO2940
8C    2920 IFV(W)<0THENV(W)=-1:GOT
      O2940
03    2930 IFV(W)=0THENV(W)=0:GOTO
      2940
58    2940 NEXTW:SC=10:MP=0:PRINT"
      [HOME,DOWN2]";:GOTO3030
4F    2950 FORER=1TO12
A7    2960 MP=MP+1:IFV(MP)=1THEN29
      90
62    2970 IFV(MP)=-1THEN3000
61    2980 IFV(MP)=0THEN3010
F3    2990 PRINTTAB(SC+(ER*2))"[GR
```

```
     EEN,RVSON]  [RVSOFF,YELLOW]"
     ::GOTO3020
A7   3000 PRINTTAB(SC+(ER*2))"[RE
     D,RVSON]  [RVSOFF,YELLOW]"::
     GOTO3020
93   3010 PRINTTAB(SC+(ER*2))"[RE
     D,RVSON,RIGHT2,RVSOFF,YELLOW
     ]";
8C   3020 NEXTER:RETURN
1C   3030 FORZZ=1TO16:PRINT"":GOS
     UB2950:NEXTZZ
F8   3040 MP=0:PRINT"[HOME,DOWN2]
     "
25   3050 MP=MP+1:IFMP=17THEN3120
73   3060 IO=HS(MP)-YS(MP):IFIO>0
     THENIO=1:GOTO3110
55   3070 IFIO<0THENIO=-1:GOTO310
     0
F3   3080 IFIO=0THENIO=0:GOTO3090
A8   3090 PRINTTAB(37)"[RVSON,RIG
     HT2,RVSOFF]":GOTO3050
A0   3100 PRINTTAB(37)"[RED,RVSON
     ]  [RVSOFF]":GOTO3050
84   3110 PRINTTAB(37)"[GREEN,RVS
     ON]  [RVSOFF]":GOTO3050
74   3120 MP=0:PRINT"[HOME,DOWN19
     ]"
2B   3130 MP=MP+1:IFMP=13THEN3200
A8   3140 IO=HM(MP)-YM(MP):IFIO>0
     THENIO=1:GOTO3190
6E   3150 IFIO<0THENIO=-1:GOTO318
     0
AC   3160 IFIO=0THENIO=0:GOTO3170
77   3170 PRINTTAB(10+(MP*2))"[RV
     SON,RIGHT2,RVSOFF]";:GOTO313
     0
9F   3180 PRINTTAB(10+(MP*2))"[RE
     D,RVSON]  [RVSOFF]";:GOTO313
     0
2B   3190 PRINTTAB(10+(MP*2))"[GR
     EEN,RVSON]  [RVSOFF]";:GOTO3
     130
17   3200 PRINT"[HOME,DOWN19]"
21   3210 IFGH=GTTHENPRINTTAB(37)
     "[RVSON,RIGHT2,RVSOFF]":GOTO
     3240
3C   3220 IFGH>GTTHENPRINTTAB(37)
     "[GREEN,RVSON]  [RVSOFF]":GO
     TO3240
AE   3230 IFGH<GTTHENPRINTTAB(37)
     "[RED,RVSON]  [RVSOFF]":GOTO
     3240
96   3240 PRINT"[YELLOW]";:FO=PEE
     K(56320)AND16
4F   3250 IFFO=0THEN570
4A   3260 GOTO3240
```

PROGRAM: CHANGE SUBJECTS

```
61   100 REM *****CHANGE SUBJECT*
     ****
21   110 POKE53280,9:POKE53281,9:
     POKE646,7:PRINTCHR$(14)
EF   120 DIMCH$(20),NB(20),NC(20)
93   130 PRINT"[CLR,RIGHT12,SC,SH
     ,SA,SN,SG,SE,SSPC,SS,SU,SB,S
     J,SE,SC,ST,SS,DOWN,LEFT15,CT
     6] [CT8]"
A0   140 PRINT"[DOWN5,RIGHT2,SY]O
     U ARE ALLOWED UP TO 16 SUBJE
     CTS IN "
59   150 PRINT"[DOWN,RIGHT2]THE B
     UDGET CALC PROGRAM.[ST]HIS P
     ROGRAM "
3D   160 PRINT"[DOWN,RIGHT2]ALLOW
     S YOU TO CHANGE THE SUBJECTS
      IN "
30   170 PRINT"[DOWN,RIGHT2]THE M
     AIN PROGRAM."
7E   180 PRINT"[DOWN4,RIGHT5] [SP
     ,SR,SE,SS2] [SA,SN,SY] [SK,S
     E,SY] TO CONTINUE"
09   190 GETA$:IFA$=""THEN190
F5   200 PRINT"[CLR,RIGHT12,SC,SH
     ,SA,SN,SG,SE,SSPC,SS,SU,SB,S
     J,SE,SC,ST,SS,DOWN,LEFT15,CT
     6] [CT8]"
B9   210 PRINT"[DOWN,RIGHT2]THE S
     UBJECTS ARE :-"
78   220 OPEN2,8,2,"0:BUDGET SUBJ
     ECTS,S,R"
F9   230 FORT=1TO16
10   240 INPUT#2,CH$(T):PRINT"[RI
     GHT19]"T;CH$(T):INPUT#2,NB(T
     ):INPUT#2,NC(T)
DF   250 NEXTT:CLOSE2:PRINT"[RIGH
     T20,WHITE]17 FINISH AMMENDIN
     G[YELLOW]"
20   260 GOTO620
10   270 PRINT"[CLR,RIGHT12,SC,SH
     ,SA,SN,SG,SE,SSPC,SS,SU,SB,S
     J,SE,SC,ST,SS,DOWN,LEFT15,CT
     6] [CT8]"
D9   280 PRINT"[DOWN3,ST]HE SUBJE
     CT [SW,SA,SS]:"CH$(SU)
6D   290 PRINT"[DOWN2]DO YOU STIL
     L WISH TO CHANGE IT (Y/N) ?"
C7   300 GETQU$:IFQU$=""THEN300
7A   310 IFQU$="N"THEN560
C9   320 IFQU$="Y"THEN340
F5   330 GOTO300
9A   340 PRINT"[CLR,RIGHT12,SC,SH
     ,SA,SN,SG,SE,SSPC,SS,SU,SB,S
     J,SE,SC,ST,SS,DOWN,LEFT15,CT
     6] [CT8]"
0F   350 PRINT"[DOWN7,SN,SO,ST,SE
     ]:MAX OF 12 CHARACTERS.[SP]L
     EASE PRESS";NB=0:NC=0
79   360 PRINT"[RIGHT9,SR,SE,ST,S
     U,SR,SN] AFTER ENTRY."
47   370 PRINT"[RIGHT11,CP6]"
03   380 PRINT"[RIGHT10,CM] ----
     [CH,DOWN,LEFT8,CM] [SC,SR,SS
     ,SR] [CG,DOWN,LEFT8,CM] ----
     [CG]"
A3   390 PRINT"[RIGHT11,CY6]"
FB   400 PRINT"[UP3,RIGHT6]USE[RI
     GHT10]FOR A SPACE!"
BD   410 INPUT"[DOWN4,SW]HAT IS S
     UBJECT'S NAME ";NA$
A5   420 NA=LEN(NA$):IFNA>12THEN3
     40
3C   430 IFNA=11THENNC=1:GOTO470
66   440 NB=INT((12-NA)/2)
8C   450 NC=NB:IFNA+NB+NC>12THENN
     B=NB-1
BB   460 NC=NB:IFNA+NB+NC<12THENN
     B=NB+1
78   470 PRINT"[DOWN4,RIGHT6]IS T
     HE NAME CORRECT (Y/N)?"
EC   480 GETQU$:IFQU$=""THEN480
A2   490 IFQU$="N"THEN340
71   500 IFQU$="Y"THEN520
C2   510 GOTO480
57   520 NB$="":FORA=1TONB:NB$=NB
     $+"[RIGHT]":NEXTA
E7   530 NC$="":FORA=1TONC:NC$=NC
     $+"[RIGHT]":NEXTA
D8   540 CH$(SU)=NB$+NA$+NC$
A0   550 NB(SU)=NB:NC(SU)=NC
83   560 PRINT"[CLR,RIGHT12,SC,SH
     ,SA,SN,SG,SE,SSPC,SS,SU,SB,S
     J,SE,SC,ST,SS,DOWN,LEFT15,CT
     6] [CT8]"
46   570 PRINT"[DOWN2,ST]HE SUBJE
     CTS ARE:-"
99   580 FORT=1TO16
41   590 PRINT"[RIGHT15]";T;"[LEF
     T],[RIGHT]";CH$(T)
2C   600 NEXTT
DF   610 PRINT"[WHITE,RIGHT15]"T"
     [LEFT],[RIGHT4]FINISH AMMEND
     ING[YELLOW]"
33   620 PRINT"[DOWN,SW]HAT IS YO
     UR CHOICE ?"
4A   630 INPUT"[UP,RIGHT20]";OP
72   640 IFOP<1OROP>17THEN560
D8   650 IFOP=17 THEN670
DD   660 SU=OP:GOTO270
2D   670 PRINT"[UP]ARE YOU SURE Y
     OU HAVE FINISHED (Y/N)?"
47   680 GETQU$:IFQU$=""THEN680
41   690 IFQU$="N"THEN560
FC   700 IFQU$="Y"THEN720
7F   710 GOTO680
85   720 OPEN2,8,2,"@0:BUDGET SUB
     JECTS,S,W"
F7   730 FORT=1TO16
CE   740 PRINT#2,CH$(T)
63   750 PRINT#2,NB(T)
62   760 PRINT#2,NC(T)
B3   770 NEXTT:CLOSE2
8F   780 END
```

PROGRAM: BUDGET END

```
E9   100 OPEN2,8,2,"0:BUDGET DATA
      2,S,R"
FB   110 FORTY=1TO192
65   120 INPUT#2,Y$(TY)
E9   130 INPUT#2,Y(TY)
3B   140 NEXTTY
B3   150 FORTY=1TO192
9A   160 INPUT#2,H$(TY)
72   170 INPUT#2,H(TY)
D3   180 NEXTTY
F7   190 INPUT#2,GT$
0C   200 FORTY=1TO12
32   210 INPUT#2,YM$(TY)
CE   220 INPUT#2,YM(TY)
E1   230 NEXTTY
44   240 FORTY=1TO12
89   250 INPUT#2,HM$(TY)
F6   260 INPUT#2,HM(TY)
B8   270 NEXTTY
01   280 FORTY=1TO16
0D   290 INPUT#2,YS$(TY)
F1   300 INPUT#2,YS(TY)
50   310 NEXTTY
79   320 FORTY=1TO16
18   330 INPUT#2,HS$(TY)
58   340 INPUT#2,HS(TY)
77   350 NEXTTY:CLOSE2:A$=STR$(CM
     +4):AC$=RIGHT$(A$,2)
D5   360 LA$="":LB$=" ":LC$="  ":
     LD$="  ":LE$="[SPC4]":PE$="
     ACTUAL ":PE=1
A6   370 LF$="[CT39]":LK$="[RIGHT
     ]":SM$="SUB [SM] MONTH[RIGHT
     ]"
21   380 ST$="SUBT":MT$="MONTHLY
     TOT[RIGHT]":MI=12
64   390 IFAM=0THEN470
0D   400 PRINT"[CLR,DOWN4,RIGHT2]
     YOU HAVE AMENDED SOME FIGURE
     S IN THE"
31   410 PRINT"[DOWN,RIGHT3]PROGR
     AM . DO YOU WISH TO STORE TH
     EM "
3A   420 PRINT"[DOWN,RIGHT12](Y)E
     S OR (N)O ?"
AD   430 GETQU$:IFQU$=""THEN430
FA   440 IFQU$="N"THENPRINT"[DOWN
     2]ARE YOU SURE YOU DO NOT WA
     NT TOO (Y/N) ?":GOTO530
```

```
44  450 IFQU$="Y"THEN480
7B  460 GOTO430
D3  470 GOTO760
26  480 PRINT"[DOWN3,SPC3]PLACE'
    DATA'DISC IN THE DISC DRIVE"

29  490 PRINT"[DOWN,RIGHT3]PRESS
     [RVSON] SPACE BAR [RVSOFF]
    TO SAVE THE DATA"
01  500 GETQU$:IFQU$=""THEN500
0A  510 IFQU$<>" "THEN500
A1  520 PRINT"[CLR,DOWN12,RIGHT1
    0]SAVING  BUDGET  DATA[BLACK
    ]":GOTO560
F1  530 GETQU$:IFQU$="N"THEN400
1C  540 IFQU$="Y"THEN470
15  550 GOTO530
74  560 OPEN2,8,2,"@0:BUDGET DAT
    A,S,W"
1F  570 PRINT#2,SR
32  580 PRINT#2,CM
D1  590 FORA=1TO192
A5  600 PRINT#2,Y$(A)
68  610 NEXTA:FORA=1TO192:PRINT#
    2,H$(A):NEXT:FORA=1TO12
6B  620 PRINT#2,SR$(A)
26  630 PRINT#2,SS$(A)
4A  640 PRINT#2,SU$(A)
6F  650 NEXT A
DF  660 FORB=1TO16
2E  670 PRINT#2,BA$(B)
2F  680 PRINT#2,BB$(B)
5C  690 PRINT#2,BC$(B)
1E  700 NEXT B
21  710 PRINT#2,GT(1)
02  720 PRINT#2,GT(2)
57  730 PRINT#2,GT(3)
54  740 CLOSE 2
E9  750 PRINT"[YELLOW]":GOTO470
24  760 PRINT"[CLR,RIGHT14]BUDGE
    T CALC[DOWN,LEFT11,CT6] [CT4
    ]"
63  770 PRINT"[DOWN]PRINT OUT:-"
    :PRINT"[SPC36,C04]";
78  780 PRINT"ACTUAL FIGURES....
    ..................[RVSON] F1
     [RVSOFF]"
CB  790 PRINT"[SPC36,C04]";
48  800 PRINT"ACTUAL & ESTIMATED
     FIGURES..........[RVSON] F3
     [RVSOFF]"
2F  810 PRINT"[SPC36,C04]";
AE  820 PRINT"ESTIMATED FIGURES
    ONLY..............[RVSON] F5
     [RVSOFF]"
A3  830 PRINT"[SPC36,C04]";
39  840 PRINT"RETURN TO THE SPRE
    ADSHEET...........[RVSON] F7
     [RVSOFF]"
A2  850 PRINT:PRINT"[SPC37,C03]"
    ;
CE  860 PRINT"END BUDGET CALC...
    ..................[RVSON] ←
     [RVSOFF]"
F5  870 PRINT"[DOWN2]WHAT IS YOU
    R OPTION?"
88  880 GETQX$:IFQX$=""THEN880
3B  890 IFQX$="[F7]"THENPRINT"[U
    P,SPC14]PLEASE WAIT":LO=1:LO
    AD"BUDGET CALC",8,1
C8  900 FORTY=1TO192:IFVAL(Y$(TY
    ))<>Y(TY)THENY$(TY)="[RIGHT]
    000":Y(TY)=0:NEXTTY
5E  910 FORTY=1TO192:IFVAL(H$(TY
    ))<>H(TY)THENH$(TY)="[RIGHT]
    000":H(TY)=0:NEXTTY
89  920 IFQX$="←"THENPRINT"[CLR]
    ":GOTO1110
68  930 IFQX$="[F1]"ORQX$="[F3]"
    ORQX$="[F5]"THEN950
96  940 GOTO880
8E  950 GOTO970
43  960 END
14  970 PRINT"[DOWN2,RIGHT2]PLEA
    SE SET UP PAPER FEED AND TUR
    N ON"
53  980 PRINT"[DOWN,SPC14]THE PR
    INTER!"
71  990 FORTP=1TO2000:NEXTTP
E7  1000 FORT=1TO2000:NEXT:PRINT
    "[DOWN2,RIGHT5]PRESS ANY KEY
     TO CONTINUE"
52  1010 GET QU$:IFQU$=""THEN101
    0
CA  1020 PRINT"[UP,SPC37,UP]"
0C  1030 OPEN3,4:PRINT#3:IFST=-1
    28THEN1050
E0  1040 CLOSE3:GOTO1180
44  1050 CLOSE3:PRINT"[CLR,SPC4]
    B U D G E T[SPC4]P R O G R A
     M M E"
E1  1060 PRINT"[RIGHT4,SE11,RIGH
    T4,SE17]"
02  1070 PRINT"[DOWN10]PLEASE TU
    RN ON THE PRINTER IF YOU WAN
    T"
C5  1080 PRINT"[DOWN,RIGHT4]A PR
    INTOUT AND PRESS 'SPACE BAR'
    "
FE  1090 PRINT"[DOWN,RIGHT11]OR
    ANY OTHER TO END"
D1  1100 GETWQ$:IFWQ$=""THEN1100

6F  1110 PRINT"[CLR,SPC4]B U D G
     E T[SPC4]P R O G R A M M E"

7D  1120 PRINT"[RIGHT4,SE11,RIGH
    T4,SE17]"
2A  1130 PRINT"[DOWN5,RIGHT4,C07
    ] [C05,SPC7,C0,SPC3,C0]"
23  1140 PRINT"[RIGHT4,RVSON]SYS
    TEMS[RIGHT]RESET[RVSOFF] ?[S
    PC3]( [RVSON]Y[RVSOFF] / [RV
    SON]N[RVSOFF] )"
38  1150 GETQA$:IFQA$=""THEN1150

81  1160 IFQA$="Y"THENSYS64738
9B  1170 GOTO390
83  1180 IFQX$="[F5]"THEN1440
9E  1190 IFQX$="[F3]"THEN1660
84  1200 IFQX$="[F1]"THEN1210
CB  1210 FORTY=1TO192
99  1220 IFY$(TY)="[RIGHT]000"TH
    ENY$(TY)="[SPC3]"
FD  1230 NEXTTY
A0  1240 FORZZ=1TO16:S$(ZZ)=MID$
    (J$(ZZ),1,13):NEXTZZ
7D  1250 OPEN3,4:PRINT#3,CHR$(14
    )"[SPC4]BUDGET PLAN FOR"CM+3
    ;"/";AC$;CHR$(15);" (ACTUAL)
    ";
1A  1260 PRINT#3,":";CHR$(14):MZ
    $;CHR$(15):CMD3
B0  1270 PRINT"[CLR]";SM$;"[SPC3
    ]";M$(1);"  ";M$(2);"  ";M$(
    3);"  ";M$(4);"  ";M$(5);"
    ";
0C  1280 PRINTM$(6);"  ";M$(7);"
      ";M$(8);"  ";M$(9);"  ";M$
    (10);"  "M$(11);"  ";
14  1290 PRINTM$(12);"[SPC3]";ST
    $
13  1300 PRINT"[C065]";
61  1310 PRINT"[C014]":PRINT
2E  1320 F=-11:FORS=1TO16:F=F+12
    :NB(S)=NB(S)+1
26  1330 PRINTS$(S);:FORSP=1TO(N
    B(S)+NC(S)):PRINT" ";:NEXTSP
    :PRINT" ";:FORPO=FTOF+11
6F  1340 PRINTY$(PO);"  ";
80  1350 NEXTPO:PRINT" ";YS$(S):
    PRINT:NEXTS
45  1360 GOTO1370
0D  1370 PRINT"[C066]";
4B  1380 PRINT"[C013]":PRINT
14  1390 PRINTMT$;LB$;:FORPO=1TO
    11:PRINTYM$(PO);" ";:NEXTPO:
    PRINTYM$(12);
66  1400 PRINTCHR$(14)GT$
F4  1410 PRINTCHR$(15)
95  1420 PRINT#3:CLOSE3
AC  1430 GOTO390
C2  1440 FORTY=1TO192
B6  1450 IFH$(TY)="[RIGHT]000"TH
    ENH$(TY)="[SPC3]"
D6  1460 NEXTTY
D5  1470 FORZZ=1TO16:S$(ZZ)=MID$
    (J$(ZZ),1,13):NEXTZZ
E5  1480 OPEN3,4:PRINT#3,CHR$(14
    )"  BUDGET PLAN FOR"CM+3;"/"
    ;AC$;CHR$(15)"( ESTIMATED )"
    ;
A9  1490 PRINT#3,CHR$(14);" :";M
    Z$;CHR$(15):CMD3
03  1500 PRINT"[CLR]";SM$;"[SPC3
    ]";M$(1);"  ";M$(2);"  ";M$(
    3);"  ";M$(4);"  ";M$(5);"
    ";
1A  1510 PRINTM$(6);"  ";M$(7);"
      ";M$(8);"  ";M$(9);"  ";M$
    (10);"  "M$(11);"  ";
EE  1520 PRINTM$(12);"[SPC3]";ST
    $
75  1530 PRINT"[C065]";
48  1540 PRINT"[C014]":PRINT
25  1550 F=-11:FORS=1TO16:F=F+12
    :NB(S)=NB(S)+1
E7  1560 PRINTS$(S);:FORSP=1TO(N
    B(S)+NC(S)):PRINT" ";:NEXTSP
    :PRINTLA$;:FORPO=FTOF+11:PRI
    NTH$(PO);"  ";
D2  1570 NEXTPO:PRINT" ";HS$(S):
    PRINT:NEXTS
22  1580 GOTO1590
60  1590 PRINT"[C066]";
26  1600 PRINT"[C013]":PRINT
26  1610 PRINTMT$;" ";LB$;:FORPO
    =1TO11:PRINTHM$(PO);" ";:NEX
    TPO:PRINTHM$(12);
BB  1620 PRINTCHR$(14)GH$
51  1630 PRINTCHR$(15)
80  1640 PRINT#3:CLOSE3
4E  1650 GOTO760
EF  1660 FORTY=1TO192
93  1670 IFH$(TY)="[RIGHT]000"TH
    ENH$(TY)="[SPC3]"
1B  1680 IFY$(TY)="[RIGHT]000"TH
    ENY$(TY)="[SPC3]"
2F  1690 NEXTTY
AA  1700 FORZZ=1TO16:S$(ZZ)=MID$
    (J$(ZZ),1,13):NEXTZZ
A8  1710 OPEN3,4:PRINT#3,CHR$(14
    )" BUDGET PLAN FOR"CM+3;"/";
    AC$;CHR$(15)"  (ACTUAL/ESTI)
    ";
8C  1720 PRINT#3,CHR$(14);" :";M
    Z$;CHR$(15):CMD3
D2  1730 PRINT"[CLR]";SM$;"[SPC3
    ]";M$(1);"  ";M$(2);"  ";M$(
    3);"  ";M$(4);"  ";M$(5);"
    ";
49  1740 PRINTM$(6);"  ";M$(7);"
      ";M$(8);"  ";M$(9);"  ";M$
    (10);"  "M$(11);"  ";
85  1750 PRINTM$(12);"[SPC3]";ST
    $
1C  1760 PRINT"[C065]";
42  1770 PRINT"[C014]":PRINT
86  1780 F=-11:FORS=1TO16:F=F+12
    :NB(S)=NB(S)+1:PRINT
BF  1790 PRINTS$(S);:FORSP=1TO(N
    B(S)+NC(S)):PRINT" ";:NEXTSP
    :PRINTLB$;:FORPO=FTOF+11:PRI
    NTY$(PO);"  ";
3E  1800 NEXTPO:PRINT" ";YS$(S)
11  1810 PRINT"[SPC14]";:FORRO=F
    TOF+11:PRINTH$(RO);"  ";:NEX
    TRO:PRINT" ";HS$(S):NEXTS
```

```
26   1820 GOTO1830
6F   1830 PRINT"[C@66]";
15   1840 PRINT"[C@13]":PRINT
69   1850 PRINTMT$;" ";LB$;:FORPO
     =1TO11:PRINTYM$(PO);" ";:NEX
     TPO:PRINTYM$(12);
28   1860 PRINTCHR$(14)GT$
02   1870 PRINTCHR$(15)
4F   1880 PRINT"[SPC12]";LB$;:FOR
     PO=1TO11:PRINTHM$(PO);" ";:N
     EXTPO:PRINTHM$(12);
B6   1890 PRINTCHR$(14)GH$
28   1900 PRINTCHR$(15)
F1   1910 PRINT#3:CLOSE3
A3   1920 GOTO760
```

PROGRAM: CHANGE MONTHS

```
FD   100 REM *****CHANGE MONTH***
     **
21   110 POKE53280,9:POKE53281,9:
     POKE646,7:PRINTCHR$(14)
FC   120 DIMM$(20)
7C   130 PRINT"[CLR,RIGHT13,SC,SH
     ,SA,SN,SG,SE,SSPC,SM,SO,SN,S
     T,SH,SS,DOWN,LEFT13,CT6] [CT
     6]"
17   140 PRINT"[DOWN3,RIGHT2,SE]A
     CH USER OF A BUDGET PROGRAM
     WILL "
FC   150 PRINT"[DOWN,RIGHT2]HAVE
     DIFFERENT FINANCIAL YEARS FR
     OM  "
73   160 PRINT"[DOWN,RIGHT2]WHICH
      FIGURES WILL RELATE TO.[SI]
     T IS  "
C8   170 PRINT"[DOWN,RIGHT2]POSSI
     BLE TO CHANGE THE MONTHS JUS
     T  "
84   180 PRINT"[DOWN,RIGHT2]LIKE
     THE SUBJECTS, IN BUDGET CALC
     ."
67   190 PRINT"[DOWN,RIGHT2,ST]HI
     S PROGRAM ALLOWS THE USER TO
     "
14   200 PRINT"[DOWN,RIGHT2]CHANG
     E THEM ."
54   210 PRINT"[DOWN4,RIGHT5] [SP
     ,SR,SE,SS2] [SA,SN,SY] [SK,S
     E,SY] TO CONTINUE"
21   220 GETA$:IFA$=""THEN220
E6   230 PRINT"[CLR,RIGHT13,SC,SH
     ,SA,SN,SG,SE,SSPC,SM,SO,SN,S
     T,SH,SS,DOWN,LEFT13,CT6] [CT
     6]":RESTORE
8F   240 PRINT"[DOWN,RIGHT2]THE M
     ONTHS ARE [RIGHT9,SS]ELECT T
     HE NO."
C7   250 PRINT"[RIGHT2]IN THE ORD
     ER[RIGHT13]OF THE MONTH[DOWN
     ]"
2F   260 OPEN2,8,2,"0:BUDGET MONT
     HS,S,R"
64   270 FORT=1TO12
E6   280 INPUT#2,M$(T):PRINT"[RIG
     HT4]"M$(T);:READA$:PRINT"[RI
     GHT19]"T;"--";A$
5D   290 NEXTT:CLOSE2
16   300 PRINT"[DOWN,RIGHT2]WHICH
      MONTH DOES THE FINANCIAL YE
     AR"
E7   310 PRINT"[RIGHT15]START "
53   320 INPUT"[DOWN,RIGHT13](1 T
     O 12) ";MO
30   330 IFMO<1ORMO>12THEN230
D9   340 RESTORE
A3   350 FORMR=1TOMO-1:READ A$:NE
     XTMR
0E   360 OPEN2,8,2,"@0:BUDGET MON
     THS,S,W"
9B   370 READA$:IFA$="END"THEN390

A9   380 PRINT#2,A$:GOTO370
4E   390 RESTORE:FORMR=1TOMO-1:RE
     AD A$:PRINT#2,A$:NEXTMR
2B   400 PRINT#2,MO
6D   410 CLOSE2
F9   420 DATA"[RIGHT]JAN[RIGHT]",
     "[RIGHT]FEB[RIGHT]","[RIGHT]
     MAR[RIGHT]","[RIGHT]APR[RIGH
     T]","[RIGHT]MAY[RIGHT]","[RI
     GHT]JUN[RIGHT]","[RIGHT]JUL[
     RIGHT]","[RIGHT]AUG[RIGHT]",
     "[RIGHT]SEP[RIGHT]"
D2   430 DATA"[RIGHT]OCT[RIGHT]",
     "[RIGHT]NOV[RIGHT]","[RIGHT]
     DEC[RIGHT]","END"
```

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B R E A K

An Amiga of your own

Thank you to all our readers who completed and returned the Readers Survey forms that went out with our September issue.

We are in the process of evaluating your views at this moment and you will no doubt see one or two tweaks to the contents of the magazine so that it gives you even more of what you want to read.

The draw for the winner of the Amiga that we were giving away has been made and the lucky person is Hugh McGhee of Sheffield.

Our congratulations to Hugh, and I hope that you enjoy using your new computer.

OOPS!

Unfortunately the listing for the TYPEWRITER program was omitted from the BYTING INTO THE 6510 article in our November 1987 issue. This program is presented in this month's Listings section.

Please note that the assembly listings presented in this series are all based on our own SPEEDY ASSEMBLER. This program is available, complete with manual, from our Readers Services department – see the Software for Sale pages for more details.

Bug Finder

We'd like to remind our readers that we run a Bug Finder service.

If you have typed in one of our programs and despite much checking, you still can't get it to run, then send us the following:

Two copies of your program on tape or disk.
A description of your problem.
If possible a listing of your work (you may omit this).
A stamped, self addressed envelope for return of the program to you.

Should any of the above be missing then we will not be able to deal with your query.

We will try to point out where you have made errors and place a corrected copy of the program back on to your tape or disk before we return it to you.

Do not send a program to us as soon as it stops working, please check it several times first.

We do get a large number of queries and so it may take a while for us to deal with yours personally.

Note: we can only deal with problems relating to programs published in *Yoru Commodore*.

At the *Your Commodore* office we receive hundreds of letters from readers every month. We do try and answer each individually but sometimes this is impossible due to pressure of work. If you have written to us and not received a personal reply, we apologise for this but we cannot promise to reply to every item of mail we receive. If you feel that your question or letter really needs an answer, then inclusion of an s.a.e. will guarantee a reply, although this may still take time to arrive.

Puzzle Corner

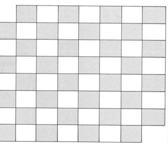
Take a close look at the diagram accompanying this text. The diagram is of a standard chess board with the two diagonally opposite corners missing.

Now, imagine that you have 31 dominoes, each of which covers exactly two squares.

Is it possible to cover the entire board using the dominoes? If it is enclose a sketch showing how you did it. If not give a brief explanation of why not.

The first correct answer pulled out of the hat after the closing date of Thursday, 31st December 1987 will win a *Your Commodore* binder.

Entries should be sent to: *Your Commodore*, Puzzle Corner, 1 Golden Square, London W1R 3AB.



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Commodore C64/128 user port to centronics printer cable. The cable is fitted with a line feed switch for the Epson range of printers. Works with all well known centronics printers. **ONLY £15.00** incl.

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Extend your commodore printer or disk drive cable by up to 2 metres

1 Metre extension cable........................**£5.00** incl
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We have mounted our C128 under the desk to save room.
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3.5" disk box holds 90 disks first class value at only **£12.50** or only **£11.50** when you buy 10 or more 3.5" disks.

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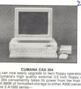

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Seek time (track to track) 3ms • Settling time 15ms • Rotational Speed 300 RPM • Data Transfer Rate 125/250 Kb per sec • Number of tracks 80 • Number of sides 2

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OUR NORMAL PRICE	**£46.50**
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AT LAST!! RS232 Interface that will not cost you the earth.

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Will fit all modems and printers with a 25 way D connector.

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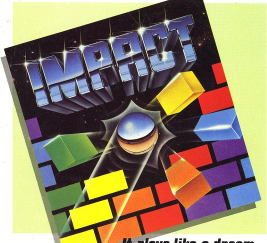
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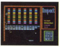
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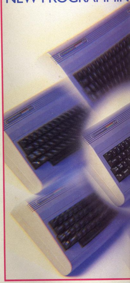

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